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Iron and Steel Influence

TO assess the influence in the electrical field of the iron and steel industry, with its numerous ramifications, in any one country is more difficult than would at first appear from a survey of the results in a particular works.

Mr. N. M. Hoogenhout leads us to this line of thought in his article this week on the electrical installation at the Pretoria (South Africa) iron and steel works, by showing that equipment utilisation factors vary considerably and with marked progressive improvement as the finished product is approached. His interpretation of the figures given in terms of the factors of operating load, percentage of full load, plant idleness and "extent of electrification" is valuable.

To what extent are the products "handled" after the heavier rolling treatments—as raw materials in other factories, for instance? The utilisation factors of 10.6, 21.7 and 25.6 per cent. for the heavy, light and sheet mills alone indicate the improvement referred to, and consumption figures per ton carry the argument still further. Roughly, rolling blooms to billets is responsible for 22 kWh per ton, billets to bars 150 kWh per ton, and bars to strip 180 kWh per ton, according to our information regarding practice in Great Britain.

The idea can be expressed partially and usefully in another way. One result of the smoothness of the electrical operation of light rolls is the more uniform thickness and better finish of the product. This results in increasingly exacting demands, so that the electrical industry must still go on unfolding the advantages of the electric drive.

The above considerations have greater influence electrically in South Africa in the future than is the case to-day. Generally the finer rolling and finishing of steel works products is probably more likely to follow than lead the establishment of large-scale smelting.

Nor is the greater influence nearer the finished product the only aspect. Steel demands more steel—and of higher quality. Many of to-day's alloy steels can only be produced by the electric furnace, and here the consumption takes an enormous jump to, say, 700 kWh per ton.

We write this without reference to the extent to which the electric furnace is used in the Union, but whatever it is the successful operation of the first large iron and steel works will prove an impetus to bigger things. And if our electrical friends there can fill the gap between the melting furnace and the present heat-treatment furnace they will be doing useful work for the industry.

Of course, we talk of influence from the broadest viewpoint, but many are more closely interested in the effect of steel works electrification upon either public supply or private generation. Such influence cannot be calculated from technical and engineering considerations alone. Generally public supply or private generation depends largely on the capacity and efficiency of existing works generating plant, the financial policy and resources of the steel producer, the amount of waste heat which is available, and on the necessity for stand-by supply.

In Pretoria the first consideration is ruled out because the works is new, and both private generation and public supply are employed on a varying basis, according to the amount of blast-furnace gas available at the moment. Mr. Hoogenhout shows that there is no need for electricity generation to be inefficient because of the use of waste heat, and production at full capacity from the 50,000 lb. per hour boilers when using 70 per cent. of blast-furnace gas is no small achievement. The idea that waste-heat usage demands a large number of small generating sets also seems to be dispelled. The electrostatic plant used at the Pretoria Steel Works has enhanced the value of blast-furnace gas, since it must materially reduce maintenance and loss of output, thus increasing still further the common interests of the electrical and the iron and steel industries.

This Appeal is Made to You

WE wish to direct our readers' attention to an appeal from Mr. Frank Parkinson on behalf of the Electrical Industries Benevolent Association which appears in our Correspondence section. His letter was accompanied by a folder entitled "Concerning All of Us," which suitably sets forth the needs and claims of those of the hundred thousand non-manual workers upon whom sickness and other misfortune or distress falls often so unexpectedly. We feel sure that if recipients of copies of this folder will carefully consider the nature of the assistance that is being given, and how much more will be required as the good work done by the Fund becomes more widely known, they will be prepared to guarantee that the organisation is provided with adequate means for carrying on its excellent work. It will be recalled that Mr. Parkinson, as president, has promised to add 10 per cent. to all subscriptions received during his year of office. We hope that there will be an immediate and generous response to his appeal, and that both at headquarters (The Secretary, 6, Southampton Street, London, W.C.1) and in the offices of the honorary branch secretaries grateful minds will be busily engaged counting up the proceeds as they think of the large number of our fellow-workers and dependants who will be helped by that added 10 per cent.

Co-ordinating Research Data

As the mass of scientific data continues to accumulate, so it becomes increasingly difficult, and at the same time increasingly necessary, to avoid waste of effort due to overlapping and the holding up of promising lines of inquiry due to lack of knowledge of what other workers have done already. A clearing-house of engineering information is required, as Sir Alexander Gibb urged at the recent British Association meeting at Nottingham. It thus appears to be worth while studying how far the plan evolved by the International Tin Research Council, as outlined in No. 6 of its miscellaneous publications, can be taken as an example. The circumstances are not quite parallel, since the Council represents producers who, by making the results of research as widely known as possible, hope to benefit from a greater consumption of tin by industry; it is thus not handicapped by any need to keep important information secret. Nevertheless, the methods adopted in looking through technical journals, patent specifications and other records of relevant activities, and in disseminating the results of its investigations, seem capable of adaptation. A nucleus exists in our own industry in *Science Abstracts*, compiled by the Institution of Electrical Engineers in association with other bodies at home and abroad.

The Appeal of Engineering

BOOKS on applied science are consulted only on special problems or for intensive study, wherein they differ from those on "cultural" subjects. Professor R. V. Southwell draws attention to this distinction in an introduction to the list of books on engineering in the Oxford City Library, in which he refers to the lack of an appreciable reading public for engineering. Yet it would be a good thing if the lives of the great practitioners were more widely read, in view of the effect of their work upon civilisation. Popular books on engineering tend to emphasise the material advantages that have been derived from it, but, as Professor Southwell says, study of their lives reveals that the dominant motive of engineers and inventors has been a zest for the struggle with impersonal forces.

Electrical Ironmongers

SINCE the formation of the Electrical Fair Trading Council the position of the ironmongers having a substantial electrical trade has been the subject of much discussion. From the outset the Electrical Contractors' Association claimed that it was competent to represent these as well as other retailers of electrical goods, and a few months ago it formed the National Association of Electrical Retailers to cater for traders genuinely in business, either wholly or partly, as electrical retailers. This was an effort to open the door wider for such people as ironmongers, but almost two years previously the Ironmongers' Federated Association had formed an Electrical Section to protect the interests of its electrical trading members. It was hardly to be expected that the I.F.A. would be agreeable to disbanding this section and advising the members to join the N.A.E.R. Any hope of this seems to be remoter now, for, according to the *Ironmonger*, the I.F.A. has announced its intention to strengthen its Electrical Section.

Motoring in Fog

FOR long past it has been a creed of possibly a majority of motorists that the use of a coloured headlight mitigated the horror of driving in a fog. Individuals had their preferences, but yellow was the most popular—indeed, legislation was introduced in France making compulsory the use of headlamps emitting light of this colour. An authoritative statement, based on observations conducted on scientific lines, was much overdue, and the Illumination Research Technical Paper (No. 20) now issued by the Department of Scientific and Industrial Research has fulfilled this purpose. The investigators seem to have knocked away any basis of a claim for greater range of visibility in fog. The R.A.C., however, has announced its intention of continuing to issue amber paper discs to its members, stating that its policy is based on "practical experience."

Heating Glasshouses

EVEN allowing for a big difference in the price of coal as delivered at a generating station and as sold to an individual user, the number of applications in which electricity is unable to compete with local combustion on a direct B.th.u. basis will always be large. To secure the adoption of electrical methods in such cases necessitates the putting of a value on their inherent advantages which varies almost every time. For instance, saving of labour in attendance on plant for heating a large glasshouse may not seem a convincing argument to a horticulturist, as Mr. C. A. Cameron-Brown points out in the *Journal* of the Ministry of Agriculture, since this work can be fitted in with other part-time duties. On the other hand, even if a change to electric heating cannot be justified at usual tariffs, there should be a field for supplementary heating in eliminating cold spots. For the man in a small way of business or the amateur, however, the labour-saving aspect counts. There is no doubt that electrification in horticulture is technically sound, but in order that it may be economically so more than average care and skill is needed in installation and operation.

"All-Electric"

IN a letter to *The Times* this week Sir D. Milne-Watson, governor of the Gas Light & Coke Co., deprecated the countenancing of the term "all-electric" by our contemporary when the premises described possessed coal fires. He emphatically stated that the gas industry did not speak of "all-gas" dwellings unless gas was used exclusively. After asserting that there is no such thing as an "all-electric" working-class dwelling, he added: "There is no 'all-electric' flat or house, so far as careful investigation shows, in which the tenant spends substantially less on coal than he does on electric current—in many instances he spends more." But even if a house is miscalled "all-electric," there must be substantial electrical usage, and if the tenant pays more for coal than for electricity it is possible that it is because electricity is so cheap. We do not know, of course, how far the "careful investigation" went, but we would certainly object to the use of the term "all-electric" to describe such dwellings. We do not think that the electrical industry is responsible for the misdescription; Sir D. Milne-Watson should blame the lay Press—they like phrases which come trippingly off the tongue.

Steel Production in South Africa

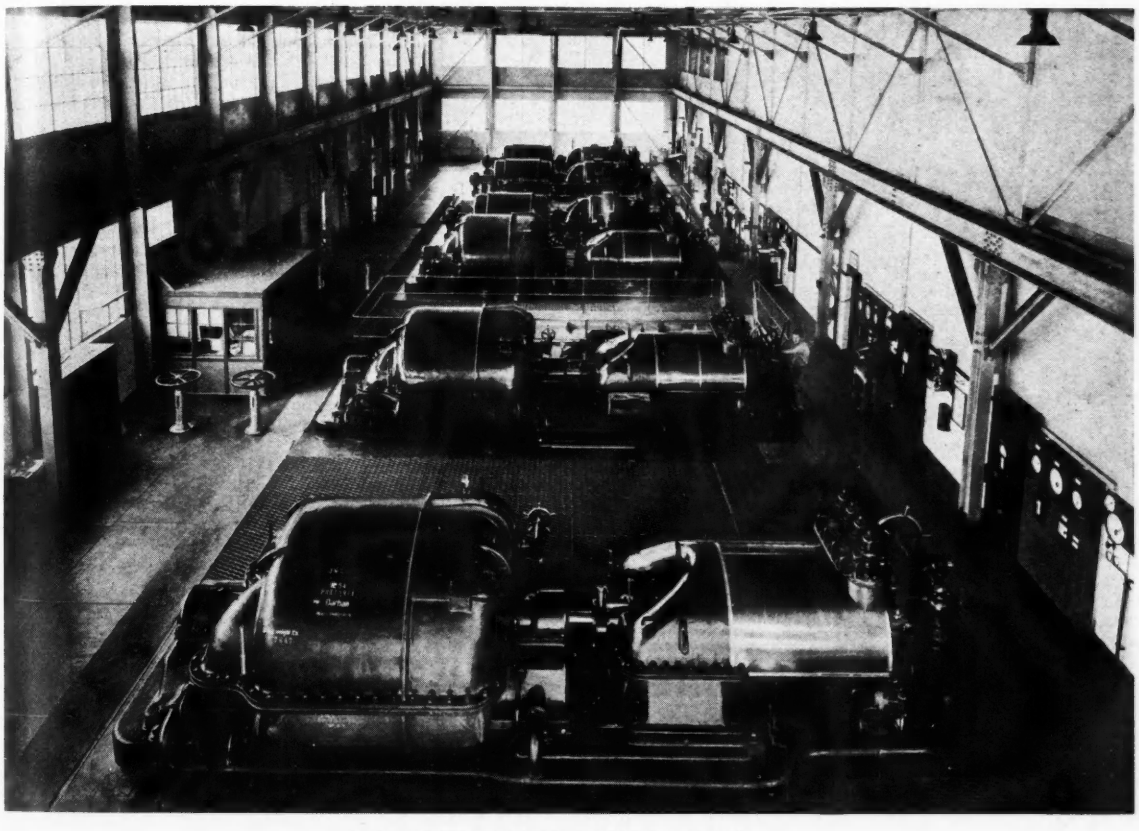
By N. M. Hoogenhout, B.Sc.(Eng.)

A description of the electrical plant at the Pretoria works of the South African Iron and Steel Corporation

IRON and steel production in South Africa is centred round the Pretoria plant of the South African Iron and Steel Corporation which commenced work early in 1934. By the courtesy of Dr. J. H. van der Bijl, chairman of the Corporation, the following description has been prepared :—

With coke ovens and by-product equipment, blast-furnace and gas-cleaning installations, open-hearth steel furnaces, a combined three-stand blooming, rail and structural mill and a rod and wire mill, as well as a waste-heat power station, crushing and calcining equipments, mechanical and electrical workshops and a foundry, this initial section exceeded its expected production of 168,000 tons of rolled sections per year twelve months after it went into operation.

A comprehensive sheet mill plant was put into production in 1935, and still further and recent extensions include an inactive mixer in the open-hearth equipment, a separate drive for the roughing and finishing stands of the heavy mill, additional soaking pits and a continuous reheating furnace. Although the estimated production for the whole of the plant was 235,000 tons and a number of the additions have only been in service for a few months, the production of finished sections for the year ended June, 1937, was 222,000 tons.



A view of the turbine room at the power station

Except for two 3,300-V overhead lines to the quartzite and dolomite quarries, respectively two and four miles distant from the works, all electrical distribution is underground.

Private generation at 11,500 V and public supply at the same voltage from the Pretoria municipal power station are interconnected. Duplicate 11,500-V feeders serve the sheet mills and No. 3 sub-stations, which, with the power station and Ilgner house, constitute the four main distribution centres. All the 11,500-V switchgear is of the metal-clad type and "split pilot" type of protection is used on the main incoming feeders from Pretoria and on the interconnecting feeders between the Ilgner and power houses. Power at 3,300 V is available at the Ilgner house and sheet mills sub-stations only.

Although intended primarily for main drive motors and motor-generator sets, 3,300 V is also used for the supply to the main pumping station, the quarry overhead lines, and two small sub-stations in the heavy rolling mills. The latter sub-stations, which have only single feeders, can, in emergency, be supplied from the main 380-V system. Except in the cases where d.c. was chosen as the most suitable supply for auxiliary drives, all power to auxiliaries throughout the works is at 380 V. The 380/200-V, 4-wire, ring-main lighting system is entirely separate from the power system.

The figures of power consumption and working hours per month in the table are averages for 1936, and the figures of h.p. installed do not include certain of the plant extensions made during and since 1936.

The most interesting feature about the loading on the electrical system are the ratios of the consumption to the equipment installed in various sections. For purposes of comparison these are given as percentages of the power which would have been consumed during working hours under 100 per cent. load factor and 100 per cent. efficiency conditions. While it was possible to arrive at a fairly accurate figure for the mean efficiency of the electric drives, it was not possible, except for such simple units as pumps and fans, to estimate at what percentage of their full load the motors would operate. By far the greater number of motors are for intermittent service

ELECTRICAL STATISTICS OF MAIN DRIVES AND SECTIONS

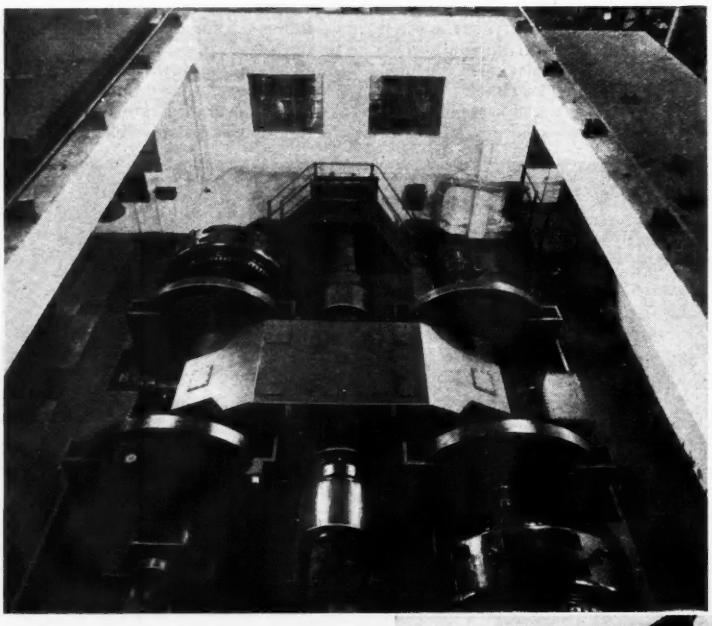
Section.	Installed horse-power.	Average monthly consumption in kWh.	Average working hours per month.	Power consumption as percentage of total.	Utilisation factor.
Coke ovens and by-products... ...	2,539	255,000	730	6.68%	18.5%
Blast furnaces ...	3,680	255,000	730	6.68%	12.7%
Steel-melting plant	4,026	400,000	730	10.46%	18.3%
Heavy mills ...	19,900	1,007,000	640	26.38%	10.6%
Light mills ...	6,990	247,000	218	6.46%	21.7%
Sheet mills ...	3,967	462,500	610	12.10%	25.6%
Pumps and compressors	1,720	630,000	730	16.50%	67.2%
Lighting	—	275,000	—	7.20%	—
Miscellaneous ...	1,280	288,000	—	7.54%	—
Total ...	44,102	3,819,500	—	100.00%	—

and in a large number of cases the main consideration was that they should be robust and powerful enough for the severest duty.

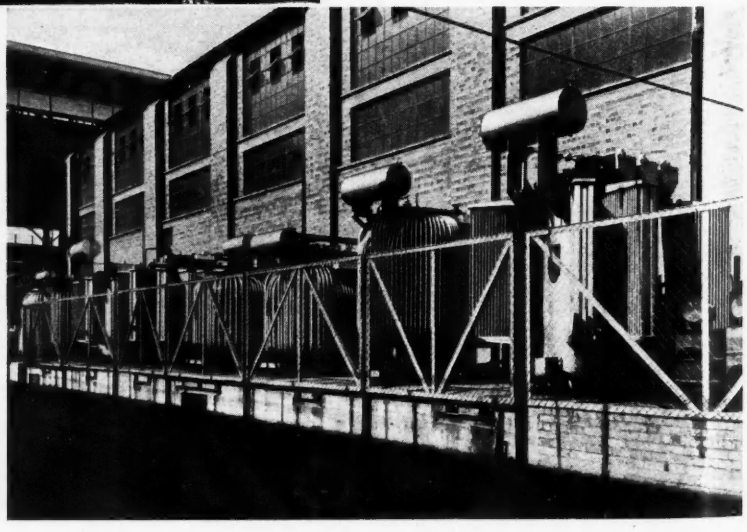
The second factor was the amount of plant standing by. In the main pumping station it is known how many pumps should run in order to maintain an adequate supply—the standby pumps are for emergency purposes only. In a place like the heavy mills, however, the amount of idle plant depends purely on what sections are being rolled.

A third factor is the extent to which a section is "electrified." In a plant where manual labour is reduced by means of electrically operated devices the ratio is nearly always low, as such drives are almost invariably of an intermittently operating kind.

One expects a high ratio for such continuous-process equipment as the coke ovens and open-hearth furnaces. For the blast-furnace installation the figure is low owing to "idleness" of the crusher plant, or bridge and automatic furnace charging gear. In the heavy mills all three of the factors mentioned contribute towards a low ratio, while the relatively high ratios in the light and sheet mills were due to greater productions than expected and practically negligible idle plant.



The power station auxiliaries account for an average consumption of 445,000 kWh during the period covered by the table, and this figure should be considered with the total demand for power. During 1936 the average load was 5,850 kW and short-time peak loads reached 12,000 kW during the second half of the year, when a second heavy mill motor had been put into commission.



Above: The main drive of the sheet mills. Right: The Ilgner house transformer bank

The works power station is designed to satisfy a number of conditions not met with in ordinary power station practice. Provision is made to burn blast-furnace gas and coke breeze under the boilers in somewhat unknown proportions as much as possible when the waste products are available. At the same time the boilers can be fired independently of blast furnace gas. Each of the five boilers is capable of an evaporation of 40,000 lb. to 50,000 lb. of steam per hour at 310 lb. per sq. in. and 720 deg. F. Chain-grate stokers fed by double compartment chutes burn coke breeze and debris coal in approximately equal proportions, and with this mixture alone the boilers can raise 40,000 lb. of steam per hour. The proportion of coal may be increased when less coke breeze is available, but the latter does not ignite successfully with less than a 50 per cent. addition of coal. Normally about 70 per cent. of the heat is supplied by blast furnace gas fed into the furnaces through three burners in the back wall, and under these conditions the boilers evaporate 50,000 lb. per hour without difficulty.

The power station also supplies blast air to two blast furnaces, three turbo blowers being installed, one as a standby. Under normal conditions each blower requires 25,000 lb. of steam per hour, but 40,000 lb. may be required by a troublesome furnace. The blowers have the first call on steam and should any shortage occur the load on the turbo-alternators is reduced in favour of public supply. Further, the generators are capable of supplying a very variable load of somewhat uncertain magnitude and operation of the turbines in conjunction with steam accumulators has been very successful. Three 3,000-r.p.m. direct-coupled impulse-reaction turbo-alternators are installed.

Two 3,500 cu. ft. Ruths steam accumulators are charged through an overflow valve whenever the steam range pressure tends to rise. A reducing valve limits the maximum shell pressure to 250 lb. per sq. in., the working range being between this pressure and a minimum of 80 lb. per sq. in. The turbines are of special design, operating on live steam from the main range and saturated steam from the accumulators. The latter is automatically admitted at two points along the expansion line as required, and only after the load reaches a certain value. At maximum load 45 per cent. of the output is drawn from the live steam range.

The generators are each capable of dealing with 5,000 kW at 0.75 power factor for short periods, the prime movers having a maximum rating of 5,250 kW for this purpose. Normally two generators in parallel supply the bulk of the works power demand, the remainder being taken from the municipal station.

The generators supply directly at 11,500 V and are protected on the Merz-Price system. Their cooling scheme is of the closed air circuit type. Local distribution is at 380 V a.c. and 440 V d.c. *via* two 2,000-kVA transformers and two 1,250-kW rotary convertors.

Works Electrical Equipment

Excluding the power station equipment there are 1,237 motors in the works with an aggregate h.p. of 44,100. The total transformer capacity is 55,350 kVA, while approximately 120 miles of underground cables feed the various equipments. From No. 3 substation power at 380 V is supplied to the coke ovens and blast-furnace sections, including the crusher and gas-cleaning equipments.

The electrical equipment in the coke oven section consists mainly of simple drives for conveyors, pumps and fans. Electric charging and coke-handling machines at the coke batteries are subject to heavy maintenance due to the intense heat, and porcelain collector insulators on the coke guide have been replaced by insulators made up out of ordinary asbestos lumber board with very satisfactory results. The blast-furnace automatic charging equipment is supplied with d.c. from the rotaries. The charge is collected and weighed in electric cars under the stock bunkers and then conveyed to the skip pit where it is discharged into one of two skips. On reaching

the top the skip discharges its load into a revolving distributor which, in turn, drops it on to a certain portion of the small furnace bell. The small bell lowers each load until the whole mixture is evenly distributed around the circumference of the large bell. The sequence is repeated after the large bell has been lowered and discharged its load into the furnace. The driver of the scale car, the only operator, initiates the sequence of operations by means of push buttons on an indicator board near the skip pit. The control panels are in a room under the skipway with the 150-h.p. hoist motor, and because of dust troubles the control panels for the more recently installed furnace have been partitioned off behind a glass screen.

After leaving the blast furnace and having some of the dust removed the gas is conditioned by being passed successively through a dust-catcher, water spray precooler and vortex type dust-catcher. In this way the gas is brought to the most favourable conditions of temperature and humidity for the first stage in the electrostatic cleaning process. After leaving the pretreater in which approximately 98 per cent. of the dust is removed the gas is passed through a slat tower for final conditioning and then lastly through the fine treaters for removal of the remaining dust.

Under favourable conditions a gas purity of 0.0044 grains per cu. ft. is obtained. There are three preheater and three fine treater chambers. The discharge electrodes in these are iron wires of sharp-pointed square cross section suspended and tensioned by means of weights between sheet-iron panels approximately 12 in. apart. The dust collects on these panels which are mounted vertically on springs. Occasional rapping of the panels causes the dust to fall down into collecting hoppers.

Seven rectifier units supply d.c. at 60,000 to 80,000 V to the discharge electrodes. The rotating-disc rectifiers are driven by small salient-pole squirrel-cage motors. Robust single-phase potential transformers step-up the pressure of the rectifier supply from 380 V. Choke coils protect the equipment from high-voltage surges.

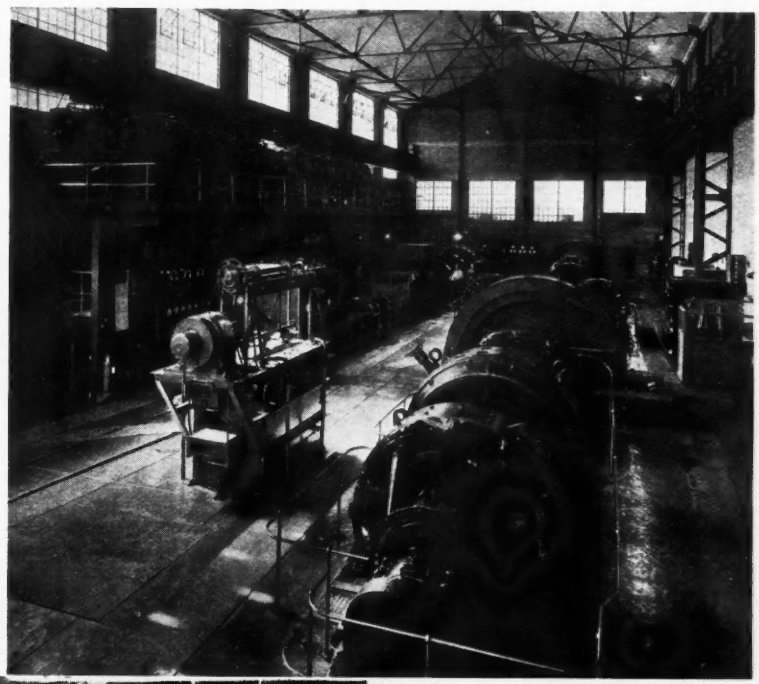
Direct current predominates in the open-hearth furnace section, where it is used for the 110-ton casting cranes, scrap handling cranes, furnace chargers and for furnace tilting. In practically all other sections of the works a.c. cranes are employed with satisfactory results. But d.c. has considerably simplified the design as far as the number of collectors on the casting cranes and furnace chargers is concerned.

More than half of the works power demand is distributed from the Ilgner house which is situated near the main heavy-mill drives.

The initial 18,000-h.p. (peak) mill motor installed drove a reversing, three-stand combined cogging, roughing and finishing mill. In 1936 a second motor was provided at the other end of the three stands so that cogging can now be done with one motor and roughing and finishing with the other.

The following particulars relate to each main drive:—Peak output 18,000 h.p., r.m.s. rating 5,600 h.p., speed ±80 r.p.m. by variation of applied voltage and ±80 to 180 r.p.m. by field weakening, time of reversal from +80 r.p.m. to −80 r.p.m. 2¼ seconds, weight of armature 55 tons, weight of complete machine 144 tons. Each Ilgner flywheel set has an a.c. driving motor of 4,200 h.p., speed range by liquid slip regulation of from 590 r.p.m. to 470 r.p.m., a flywheel weight of 33 tons, and three d.c. generators connected in series (each 430 V 4,680 kW peak).

The mill motors are connected solid to the Ilgner sets, and all overload protective devices merely interrupt the field current of the Ilgner generator exciters. The mill motor field coil windings are in two equal sections. One half is permanently excited and the excitation of the other half is variable. For speeds up to 80 r.p.m. both windings are fully excited and speed variation is accomplished by variation of the voltage output of the Ilgner generators. Speed increases above 80 r.p.m. are obtained by reducing, and finally to a certain extent by reversing, the excitation of the second winding. This type of control is extremely simple since all controls operate on the exciter machine field circuits. The main controllers are actuated by servo-motors which prevent too drastic action of the potentiometer contacts and also minimise the effort required on the part of the driver.



Above: The Ilgner house sub-station. Left: The power station switch room

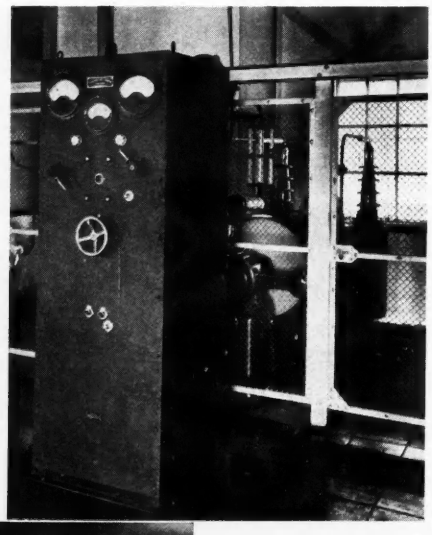
The flywheel sets are equipped with dynamic eddy-current brakes in addition to the usual flywheel rim brakes. The maximum peripheral speed of the flywheels is in the neighbourhood of 250 miles per hour. Stresses set up by excessive temperature rises in the rims as well as rapid wear of the brake linings make it inadvisable to bring the sets to a standstill with the mechanical brake alone in less than 15 minutes, so the eddy current brake is preferred. Both brakes acting together can stop the set in from five to seven minutes.

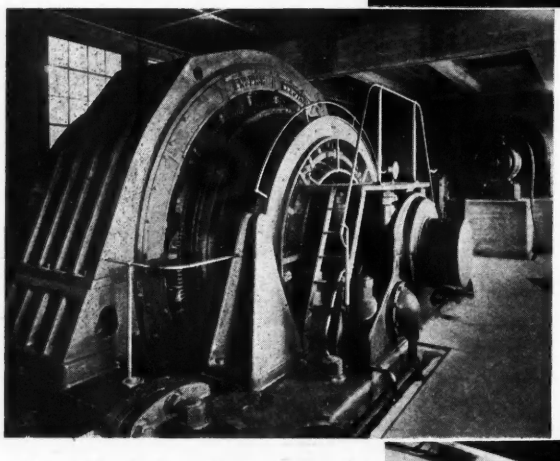
Direct-current auxiliary drives are used only for equipment requiring very frequent starting and stopping, such as screw-downs and manipulators. Except on crane motors of up to 20 h.p. all intermittent auxiliary drives are controlled by means of master controllers and contactor gear.

Contactor control panels are built up in separate sheet-steel cubicles arranged through bus-bar connection for grouping. The panels controlling the mill auxiliaries are situated on a platform overlooking the mills. The frames of all intermittent service motors are of cast steel, and are split horizontally to facilitate repair.

The light mill main drives are also supplied from a motor-generator set in the Ilger house. A 5,500-h.p., 3,300-V synchronous motor drives three d.c. generators—two of 4,680 kW (peak) and a smaller one (1,050 kW). Of the five main light mill drives two of 2,200 h.p. serve the continuous roughing and staggered finishing trains through gear boxes and three smaller ones serve a continuous-wire train. It is possible by means of cross-connecting links to drive all five motors from the two parallel generators only or to use the smaller generator separately to supply either the wire train motors or the roughing-stand motor. Owing to the wide variety of products produced in the light mills—$\frac{3}{16}$in. wire to 2in. angles—it is necessary to have great flexibility in the manner in which the motor drives are supplied and their speeds selected. In general, the speed of the mill as a whole is controlled on the Ward-Leonard principle, individual speeds being adjusted by field regulation.

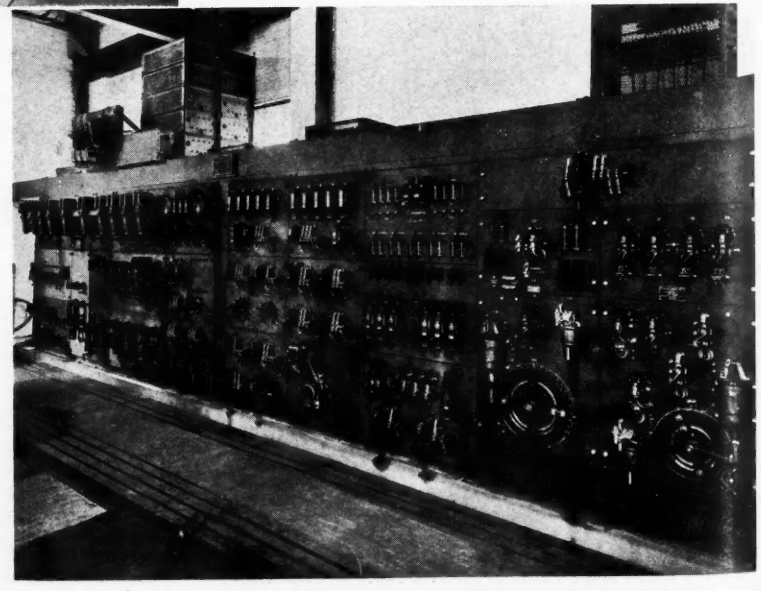
Two automatic wire reel drives and a rotary shear drive are speed-matched to the mills by means of carbon pile regulators. Small alternators on the staggered train





motor and final motor supply the reference speeds through synchronous motors to a differential gear which actuates the carbon piles. After leaving the final stand of the staggered train the rods run through a rotary shear into troughs along the cooling bank. On

Above: Cogging mill motor. Right: Blast-furnace automatic charging panel



reaching a certain point along the bank they energise a photoelectric cell which, through suitable relays, initiates a timing process whereby the rods are first cut to the length of the bank and then transferred from the run-out channels on to the cooling racks.

As the timing process is also matched to the speed of the mill, speed variations are immaterial to the accuracy with which the bars are cut to length. Being able to choose accurate multiples of the finished lengths required plays an important part in the economy of this section.

Two 1,200-h.p. induction motors driving the sheet mill are coupled to the gear box at diagonally opposite corners. Permanent slip resistances in the rotor circuits enable the four high-speed flywheels to act as buffers between the mill peak loads and the power system. The gear box is of the double-reduction type and drives seven tandem mill stands at 28 r.p.m.

This type of drive is a relatively recent departure from the older type of low-speed flywheel and rope drive which has held the field for many years. Improvement in materials and gear design made possible a gear box capable of withstanding the very severe shocks encountered in this type of drive.

In order to avoid frequent roll breakages due to unequal expansion when starting from cold it is necessary first to heat the rolls to a temperature of approximately 300 deg. C. This is effected by means of a cage of heavy copper coil-sections which is placed over the rolls. Each turn of the coil is connected through by means of flexible asbestos-covered cable after the cage has been placed in position. A special transformer serves the roll heaters at 120 V a.c.

Part of the gas-cleaning plant rectifier equipment

A duct under the floor plates along the entire length of the mill carries the busbars to which the roll heaters are connected. As the heaters are not in contact with the rolls it is possible to heat up any pair of rolls in the mill train while they are revolving and without interfering in any way with the operation of the other mill stands.

A full description of the power plant was given in a paper read before the South African Institute of Electrical Engineers last December by Mr. A. M. Jacobs, chief engineer to the South African Electricity Supply Commission, who was responsible for the design of the station.

I.E.E. Sectional Meetings

The Meter and Instrument Section opens its 1937-38 session on November 5th, when Mr. H. Cobden Turner is to give his chairman's address. The section dinner is arranged for November 19th, at the Holborn Restaurant, and on December 10th Mr. C. W. Hughes will speak on "Organisation of a Meter Test Department of a Large Supply Undertaking." On January 7th "The Calibration of Sphere Gaps with Impulse Voltages" will be discussed by Messrs. R. Davis and G. W. Bowdler, and "The Calibration of the Sphere Gap for Voltage Measurement up to One Million Volts (Effective) at Fifty Cycles," by Messrs. F. S. Edwards and J. F. Smee. There are five further meetings. The first meeting of the session of the Wireless Section is fixed for November 3rd, when the chairman (Mr. T. Wadsworth) will deliver his inaugural address. On December 1st Messrs. A. E. Barrett and C. J. F. Tweed will discuss "Some Aspects of Magnetic Recording and its Application to Broadcasting." Dates of other meetings are January 5th, February 2nd, March 2nd, April 6th, and May 4th; there will also be three informal meetings.

Internal Mains

By D. Winton Thorpe, M.I.E.E.

The author, an electrical consultant, urges the necessity for providing adequate electrical distribution arrangements in the constructional stage of blocks of flats and other large buildings

IN my dictionary of synonyms under the heading "Main" come the following words: "Notable, prominent, memorable, remarkable, serious, urgent, critical, paramount"—and many others of the same import. I only wish that these synonyms could be written on a card and hung up in the office of every architect and every person having authority over the electrical installations which go into large buildings to-day.

After many years of dragging along somewhat behind the times supply undertakings are now coming to regard the mains question as being in the words of my dictionary; "paramount." A consumer has only had within comparatively few years this question of mains thrown upon his shoulders, and is now inclined to take upon himself the responsibility in the somewhat sluggish way in which supply undertakings in the past were wont to accept this same burden. If we can only steal a march on time and achieve now, or in the very near future, what most certainly will be achieved in the next ten years, then the electrical industry as a whole must reap the benefit.

I would ask any reader to picture himself living in a top-floor flat of a ten-storey block of flats. Would he rather that he were provided with adequate socket outlets in each room which would serve the cooker, the refrigerator, the fire and all the hundred and one electrical accessories available to him but have no adequate main service available, or would he prefer that he should find in his flat a rising main capable of almost anything even if he had to pay himself for the wiring of such socket outlets as he wanted? I do not think there can be more than one answer to this.

[*Gravure Co.*

Mr. D. Winton Thorpe

Let us get it very clearly into our minds that mains are an important part of an installation. Further than this, if we can, let us get it into our minds that they are the *most* important part of an installation. Other parts can be corrected later. It is true that it is better to aim at the perfect installation from the word "go," but of all the components which make up a wiring installation to-day, the mains undoubtedly represent the most inexorable and therefore the most important thing to get right in the first instance. Unless we persuade ourselves to this point of view, we cannot possibly hope to persuade the uninitiated architect or property-owner. If, on the other hand, we accept this creed with something akin to fervour, we can all of us—for we are all travellers for the electrical industry—do our share to anticipate the lesson which undoubtedly will be learnt in the next few years and help to see that the buildings which are going up to-day are properly equipped for the future in terms of electricity.

True and False Economy

Building these days has become, unfortunately, a purely commercial matter. The idea of cutting the cost to a bare minimum has become not only universal but accepted as a proper principle of building. So long as the building does not fall down and contains the requisite number of cubic feet it is considered to be appropriate to its job. Just as good architects are rebelling against this disgraceful conception of building, so we electrical engineers should be in a state of mutiny about the useless conception of electricity so often apparent in modern buildings.

On the other hand, we cannot possibly afford to ignore the claims of economy. It is the easiest matter in the world to plan a fabulously expensive and technically perfect installation without regard to the cost. We engineers have got to master the economics of our craft just as much as the technicalities. But if we accept the fact that the mains are the most important part of an electrical installation to-day, then we should, I contend, give to the economic question relating to the provision of mains slightly more thought than we give to any other part of our installation. This, unfortunately, is not done, and the mains are apt to become a matter of secondary importance, thought of only when the job is halfway through and slapped in any convenient position which then offers—lift shafts being a strong favourite.

One of the strangest things about this question of rising mains is the fact that the bus-bar principle or the bare copper rising mains method has not met with the popularity which its rather obvious merits deserve. There is, I know, a definite impression that while bare copper rising mains may be excellent they do cost a lot money. I have before me as I write some rather interesting figures which entirely refute this notion.

In a block of flats of nine floors in Central London the consumers' mains started at the supply company's transformer chamber and from this point four four-core p.i.l.c.a. cables were run through main switch-fuses (three-phase four-wire 250-A) to the base of four vertical chases. The connected load per flat was just under 70 A, and there were forty flats to be served from each rising main; this allowed a distribution of 12 to 14 flats per phase per riser, giving a total connected load per riser of 2,700 A or 900 A per phase. The diversity factor was put at four, which was probably lavish, at least in view of the existing conditions. The actual rising mains consisted of four $\frac{5}{8}$-in. copper rods, the rods being delivered to the site for erection in sections having the same length as the floor heights. Each section consisted of four rods each 10 ft. in length mounted on a light iron structure about 5 ft. in length with suitable insulators and caps. This iron structure also carried the take-off board with four or five 60-A fuses and a neutral connection bar. Each board served four or five flats on its own floor and was connected to one phase and the neutral with facilities for rapid changing of phases. In parenthesis it should be observed that one of the many strong arguments in favour of copper rising mains is the facility with which it lends itself to rebalancing of phases.

Cables and Bare Copper

The original estimate for this job was prepared by the electrical contractors with the idea of running four-core cables for the vertical risers as well as for the horizontal ones and the sum quoted was over £800, including the electrical contractors' profit. This figure was a genuine quotation with the expectation that this system would be used, and may therefore be taken as reasonably accurate. However, the plans were altered and instead the bare copper system was employed, when the actual price, including again the contractors' profit, was under £600. Here, then, there was a very definite saving of over £200. To be quite fair in comparison it should be noted that there was a certain amount of extra expense incurred on the building side in the formation of these chases; but it is doubtful if this would account for the £200.

It appeared that the chief saving on this mains job was in labour which was calculated to be about half what it would have been had cables been used. The take-off boards were very much cheaper than those required for the cable, there being no cast iron cases or joint boxes. The net result is, of course, that the mains as installed at the moment are capable of considerable extension of load, and even should it become necessary at any time to increase the load still further the ease of replacement of the copper rods speaks for itself.

It is, I believe, a maxim of all salesmanship, that you must create the demand for a commodity before you try to sell it. It may be that in the selling of it you do create that demand. Now internal mains have, unfortunately, a prosaic and uninteresting character. To begin with they are "nobody's baby." The building proprietor hopes that the supply undertaking will provide them, while the supply undertaking may be quite certain that the building proprietor will provide them. For this and many other reasons mains do take on themselves an unexciting and therefore apparently unimportant mantle.

Fortunately, however, there are many supply undertakings to-day who, after their years of groping, see so clearly the absolute importance of mains that they are prepared to put them in, in some cases unconditionally, and in other cases with comparatively light conditions. This offer on the part of those far-seeing undertakings is made not so much as a bribe to the building proprietor to use electricity exclusively—for the wise electricity supply undertaking knows that the

occupants of that building will in a very short space of time clamour for electricity on their own—as to ensure that the mains which are put in are of adequate size to cope not only with the immediate demand but with the demand which an intelligent electrical engineer can visualise for the future. Some supply undertakings in their enthusiasm for this excellent cause even exceed their powers somewhat by making quite unenforceable regulations as to the size of the mains which the proprietor of the building must install where such buildings are intended for the letting of separate suites of rooms or flats.

One of the unfortunate results of this relegating to the background of mains is that comparatively few people have accepted internal mains as a study of their own worth the greatest consideration. Three- or four-core paper insulated lead-covered single wire armoured cable is apt to be so readily accepted (with perhaps the exception of non-bleeding type of cable taking the place to-day of paper cables) that various other methods of distributing electricity in bulk throughout a large building have been almost totally ignored, or else viewed from afar as interesting experiments only.

I have spoken with electrical contractors and consulting engineers who take the view that life is not long enough to argue with an architect in order to persuade him to make some provision for, say, a bare copper system of rising mains, or even to provide a duct for the conventional cables; and that the idea of a vertical ring main system is obviously too costly to be considered. Yet this same architect does not think that flues are too costly to be considered—we, in the electrical industry wish he would! He does not consider that he is doing anything out of the ordinary in making some special provision for the exclusion of rain from the building or providing ducts for water pipes. No doubt those interested in these specialist sub-contracts relating to building did in their early days find much difficulty in persuading architects that such were necessary; but after many many years—for they were in the field long before us—they have succeeded in infusing an enthusiasm for their existence in the hearts of architects. We, in the electrical industry have learned to move rather faster than other people, and it seems a pity that we should have to wait a long time before these undoubtedly sound ideas slowly percolate through and find acceptance.

Perhaps the most pathetic of all the Herculean labours of those connected with the use of electricity is to be found in the factory. The last few years should have taught us a lesson in this respect, for they have seen factories expand to three or four times their output with, in most cases, four or five changes of main cables to suit each set of prevailing conditions. Factories are probably the most quickly altering type of building so far as electrical requirements are concerned. An electrical staff is usually employed in a large factory for maintenance, altering distribution fuse-boards, putting in a 30-A main switch here, taking out one there. Yet with all this flexibility and alteration in load, mains in nine cases out of ten are installed to cope with precisely the load of the moment, arranged in the position of the moment.

At a certain new block of offices in the West End recently I tried every artifice to persuade the proprietor and his architect to have mains installed which should be sufficient to cope with quite a large consumption of electricity. I met with no success, and was ultimately instructed to supply mains just large enough for the connected load, which was a bare minimum of lighting and socket outlets.

The building went up and the first prospective tenant asked for electric heating instead of the existing hot water radiation. So a second main was run up to provide for this. Then another tenant wanted 600 A for special process work on one floor. This was quite impossible on the existing mains, and in order to let this one floor only at the top of the building—it was necessary to build a transformer chamber in the area and run up an outside main. Once again only the capacity required by the tenant in question was allowed for. I have little doubt that a further demand on other floors for consumption in excess of the capacity of this new main will be made, when we shall probably run up a fourth main.

It is pitiable examples of this sort which can be found by the hundred that establish beyond doubt the fact that there is more room for education in the matter of internal mains than in any other branch of domestic consumption.

I am convinced of one thing. It is quite useless to try to concentrate on the proprietor who puts up a building, or on his architect. The propaganda which this side of electrical development needs so badly should be directed at the estate agents and property managers who, acting for tenants or subsequent purchasers of the building, should make their first demand "Is there adequate capacity for unlimited use of electricity as and when it may be wanted?" If the answer is in the negative, these estate agents should be taught to turn down the property. This alone would bring property builders to their senses.

Electricity Supply in India. By J. W. Meares, C.I.E.

The effect of the recent constitutional changes

So great an upheaval as has occurred in the governance of India since the passing of the Government of India Act, 1935, cannot fail to have repercussions on the whole economic situation in the Empire, and electricity has not been exempt. Fortunately, in a country where the electric fan has revolutionised the living conditions, while greatly improving the load factor of supply undertakings, the benefits are not confined to any one of the warring political or religious factions or to any one of the many races inhabiting the sub-continent, with the result that it is to the interest of all alike that electricity shall be available at all times and in all places. At present this is far from being the case, but progress in recent years has been on a rising curve owing largely to the extended use of water power in several Provinces; this is well brought out in the article on "The Indian Electrical Market" in the Electrical Review of October 1st (page 443).

Under the new dispensation, the major provinces are practically self-governing, and in such industrial matters as electricity supply and boiler administration the minor provinces will be in fact so, though constitutionally under the control of the Central (presently to be Federal) Government. Obviously it is of the greatest importance to the industry in all its ramifications that the conditions shall be uniform everywhere, instead of varying with geographical or political boundaries.

The Indian Electricity Act applies to the whole of British India, and has to some extent been adopted in certain Indian (hitherto Native) States. Consequently the rules under that Act, which are of even more practical importance, similarly apply at the present time. Electricity is included in what is known as the "concurrent legislative list" of subjects, *i.e.*, it can be dealt with both by the Central and Provincial Governments; but it is a purely provincial subject for all administrative purposes. In theory, therefore, any province could make its own rules, and chaos would necessarily result. This difficulty has been ingeniously surmounted by amending the Act.

The new rules of 1937 were made by the Governor-General in Council as heretofore; but a new section of the Act, added in 1937, enacts that a "Central Electricity Board" shall have the sole rule-making power. But no sooner were the 1937 rules made than doubt was cast on their validity, in view of this new provision; and a special "Rules and Regulations Continuance Act" is now in process of being passed to remove doubts in this matter and also in the similar case of boilers, the rules for which are hereafter to be made by a "Central Boilers Board" representing all the provinces.

The chairman of the new Electricity Board is to be appointed by the Central Government, *i.e.*, the Government of India; each major province will appoint one member, and there are to be members representing the minor provinces and mines. The Board, however, is not directly responsible for rules relating to railways, mines and oil-fields, which are subjects reserved to the Central Government by virtue of the "Government of India (Adaptation of Laws) Order, 1937" issued under the India Act as a (British) Statutory Order. This Order has also made extensive alterations throughout the Act, mainly in the formal matter of nomenclature.

Burma is no longer a part of India, since the passing of the Government of Burma Act, 1935. As, however, both the Electricity Act and the rules applied to Burma before the separation, this arrangement has been continued under another set of statutory rules and orders, the "Government of Burma (Adaptation of Laws) Order, 1937," which further amends the Act extensively in administrative detail and nomenclature. All references to Indian Governments disappear, the Governor of Burma becoming the sole authority; in future it will be open to him to amend both Act and rules if he choses. The value of uniformity with India is, however, not likely to be lightly or wantonly set aside.

One other recent development in India is worthy of mention. In both Bombay and Bengal special legislation has been passed to enable "electricity duties" to be levied and they have been imposed in the form of a small tax per unit. In view of the vast new expenditure and chronic financial stringency, this procedure is certain to be followed before long in other provinces and Burma.

Utility Lighting Equipment

Some special fittings for the home

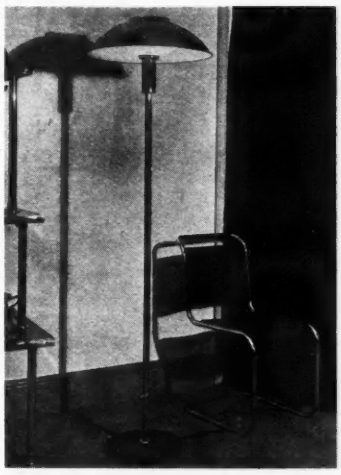
THE directional control of lighting mainly to give a greater downward projection, but permitting also some general diffusion, is now also of domestic interest, and most of the equipment designed for this purpose is essentially "utility" in character. The "Louverlux" fittings by Troughton & Young, Ltd., have vertical circular louvres at the bottom. Amplilux, Ltd., employ a prismatic ring externally round the lamp which affords as much as 200 per cent. greater downward light.

The "Benflux" (Benjamin Electric Ltd.) concentrates the light where required by means of a deep opal shade which eliminates dazzle and softens the light. Ceiling illumination is permitted by an aperture in a 10-in. reflector around the shade. "Coolison" shades (supplied by a number of concerns) also ensure that the light is directed where it is needed and can be used with standard lampholders. A "lip" type enclosed ceiling fitting by Ekram Electric, Ltd., is cylindrical with a "ring expansion" at the bottom. The reflecting surface incorporated in the Boula lamp enables its light to be directed without the need for a special fitting.

The "Better Light" table lamp of Better Vision Products, Ltd., is designed for near-to work use. Of all-metal construction, it has almost a flat-top reflector with a downward "pip" immediately over the lamp, a shielding ring around the lamp and also a cup reflector under the lamp. The maximum light at table level of 36 ft.-candles is at a circle 15 in. from the stand. The portable desk lamp of Kandem Electrical, Ltd., has a translucent dome on which a metal reflector can be tilted in any direction. The exposed dome at the top provides general illumination.

Although the louvres at the bottom of the decorative fitting of Knightshades, Ltd., are intended for ornamentation, we find that actually they afford a degree of downward control. The Linealux trough type fitting for local lighting can be adapted to bed, mirror or wall use by special fittings.

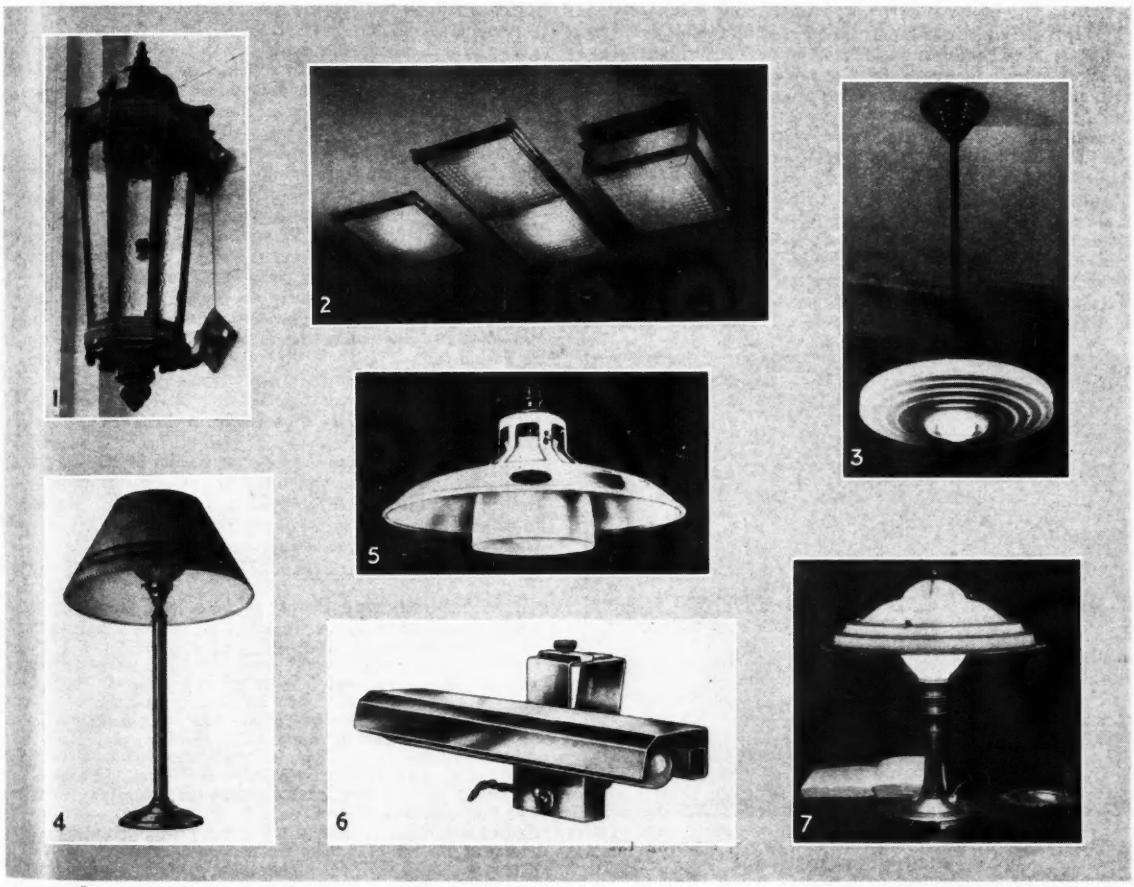
In the "Sunray" of McLeod & McLeod (1935), Ltd., the multi-mirror effect is aimed at and focusing permits a degree of controls. The "Mekelite" (Mek-Elek Engineering, Ltd.) provides an excellent method of control for local lighting. The adjustable bracket of the "Telelite" produced by Novonotions, Ltd., has a telescopic arm which provides extension to nearly 4 ft., while projection is permitted in any direction. A development of the Siemens "study" lamp which embodies the principles of semi-indirect lighting is a floor-standard model. To meet the requirements of low ceilings William McGeoch & Co., Ltd., have introduced a shallow decorated bowl which rests in a neat ceiling-fixture circular frame.



Philips controlled light floor standard

The bakelite shade seems to be a suggestion from America; it is claimed to afford higher efficiency in reflection and desirable low intensity of brightness exposed to the eye. A range of such shades introduced by Ward & Goldstone, Ltd., are specially suitable for utility use, but are also available in artistic colourings. A bedside lamp marketed by T.M.C.-Harwell (Sales), Ltd., has a translucent bakelite shade.

Distinction is added to any residence by a carefully chosen entrance lantern, for which purpose period metal-work is particularly popular. The Tucker & Edgar Georgian style bracket lantern with cathedral glass and the all-enclosed armour bright lantern with a wrought-iron bracket listed by



1. A Georgian exterior lantern (Tucker & Edgar). 2. Holophane recessed and surface "Hedralite" fittings. 3. The "Excelsior" with Amplilux prismatic ring. 4. The Siemens study lamp. 5. "Benflux" controlled light unit. 6. Linealux bed, mirror or wall unit. 7. "Better Vision" standard

the Sloan Electrical Co. Ltd., are excellent examples of such equipment.

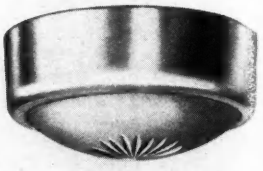
A circle of light (" Mazda " tubes)

Within the domestic field the lay light probably provides the biggest opportunities for built-in lighting. The G.E.C.'s " fluorescent " tubes are a convenient medium for lay light schemes and G.V.D. Illuminators, Ltd., apply their special system to this form of lighting. The latter showed us a 6 ft. by 4 ft. lay-out evenly lighted by one 200-W lamp. A special note of distinction can be obtained from a well - designed and illuminated wall niche. The one illustrated in our last issue is arranged above a horizontal tinted glass panel measuring 3 ft. by 6 in.

Holophane, Ltd., have found their " Hedralite " panels made up to any size or combination to be a successful dining-room scheme where there is sufficient room for the recessing of lamps and back reflectors. A cornice lighting scheme is offered by Straight-Lite Reflectors, Ltd., employing closed and open straight and corner sections with opal glasses and " Maxtrip " tubular lamps.

Some confusion exists as to what is meant by architectural lighting. We have heard the term interpreted as lighting specially projected on to architectural features, any lighting for built-in equipment and lighting (structural outlining and otherwise) by means of architectural (tubular) lamps. A good example of the great variety of fittings which can be constructed from tubular lamps is the " circle of light " illustrated which is made up of four quarter-circle lamps produced by British Thomson-Houston Co., Ltd., and suspended in the horizontal plane.

We have been disappointed in not hearing much about the use of colour lighting as a means of room decoration in the sense of producing complete colour schemes which was strongly advocated soon after the war. Most manufacturers believe there is little or no scope for business owing to the expense. Holophane, Ltd., however, say that there is a definite move in favour of colour lighting in larger homes. Schemes are based on the company's system of lighting for stages and ballrooms, and the effects are obtained from the use of clear lamps with scientific reflector and refractor equipment and colour filters. The complete scheme provides for the regulation of colour circuits for blending by dimmer selective controlled mechanism which is responsible for most of the cost. A scheme for, say, a 30-ft. by 20-ft. dining room would cost roughly £200 to £300. Without automatic mixing, it was said, the cost might be reduced to £100.



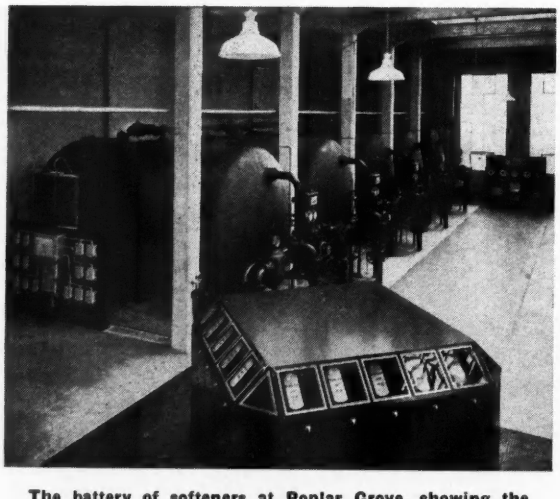
Low ceiling fitting (W. McGeoch & Co.)

Light from the G.E.C. " fluorescent " tubes is said to have a peculiar vitality which enhances the appearance of objects on which it strikes. Warmth of tone is provided by the basic colour of light from the neon discharge.

Automatic Water-softening Plant

WHAT is said to be the first unattended zeolite water-softening plant in the world and the first also to embody automatic double salting was started up on Tuesday last. This is the plant at the West Cheshire Water Board's pumping station at Poplar Grove, where five pressure-type " Permutit " units have been installed with a total output of 415,000 gal. of zero soft water per regeneration. The soft water is mixed with borehole water of 16 deg. (English) hardness in order to reduce the value to 9.5 deg.

Automatic operation is obtained by means of a " Permutit " multi-port valve, working in conjunction with an electrical contacting meter fitted on the soft-water outlet main. The multi-port valve has connections for the waste water, softened water and the inlet and outlet pads on the softener. While the plant is working a rotating slide within the valve operates in relation to a fixed port plate so that the hard water is



The battery of softeners at Poplar Grove, showing the electrical control equipment

introduced into the top of the plant and softened water passes through the valve to service. When the rated output has been treated, the reconditioning cycle is initiated by the closing of the electrical contacts on the meter starting up a motor driving, through gearing, the rotating slide. The motor also drives a device which breaks the circuit when the valve slide reaches the back washing position, at which stage the hard water flows to the plant through the soft water collecting system, is cleansed by rising up through the zeolite and passes to the drain.

After back washing a time switch recloses the circuit and the motor starts up to rotate the valve to the salting position after which it stops and simultaneously a diaphragm valve is opened to admit the requisite amount of brine until a float on the brine tank restarts the motor. The valve then reaches the rinsing position and remains there until a time switch returns it to the softening position. The plant then delivers its rated capacity, after which the meter again starts the regenerating cycle. The meter incorporates a motor-operated device to rest the contacting mechanism before the softening run is begun.

The five softening units are interlocked electrically so that if two became ready for regenerating at the same time, one of them is automatically shut down until the other has been reconditioned.

Our illustration shows the new plant, and in the foreground is the control table in which all the essential recording and control instruments are grouped and from which the superintendent can check immediately the operation of the whole plant or any individual section of it.

Submarine Power Cables in Canada

For augmenting its transmission system to the area south of the St. Lawrence River, the Shawinigan Water & Power Co. has recently run two 0.1 sq. in. 27.5-kV cables (4,500 and 4,200 ft. long) under the river bed in the narrows about forty miles below Montreal. The voltage is stated by *Electrical News and Engineering* to be the highest yet employed in Canada for submarine work. The insulation on each conductor consists of 24-64 in. saturated graded-density paper shielded by a 0.003-in. copper-foil " H " tape. The belt tape is 0.005-in. bronze strip intercollated with saturated paper tape and the sheath is 5/32-in. pure lead. Steel wire armour (36-No. 5 s.w.g.) is laid up over the jute serving, giving an overall overall diameter of 3.46 in. The use of graded densities of paper, in which the inner layers are of high specific inductive capacity is expected to give at least 10 per cent. higher impulse strength than ordinary paper. Only one joint has been made in each cable, which are connected to an overhead transmission system.

A Fire-resisting Cable

The construction and advantages of Pyrotenax

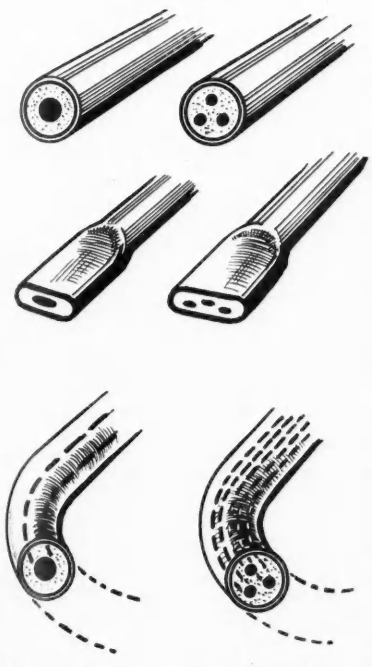
A NEW class of electric cable now being produced at Hebburn-on-Tyne is quite unlike any other commercially available type. It represents a remarkable advance in the technique of insulated cable manufacture. This development of a French invention has been associated from the first with Messrs. A. Reyrolle & Co., Ltd. Their quest for means of rendering switchgear control cable more immune from fault and fire risks is well known. Imperial Chemical Industries, Ltd., has since become interested in the venture as the supplier of copper tubing and wire.

The "Pyrotenax" system of wiring is adaptable to varied practical applications, including some which are not possible with existing systems. It is already in actual use for lighting and power circuits, both in England and France. The new cable does not need to be protected externally by conduit or armouring, yet it is claimed to be absolutely fireproof, because the dry oxide insulation will not burn.

Two materials only are utilised. The outer envelope is a seamless copper tube. The inner conductors, both single- and multi-core, are copper wires insulated from each other and from the outer sheath by means of a refractory substance, usually magnesia, which is highly compressed during manufacture. This is achieved by drawing down the pre-formed cable complete through dies, with interstage annealing. The insulating material is thus subjected to a compressive force of 25 tons per sq. in. Consequently it acts as an isotropic and homogeneous mass, plastic-like in manner when the cable is bent or hammered out of shape, so maintaining continuity during and after deformation.

Cables for use up to 600 V have an insulation thickness of 0.06 in. and are given a 2,500-V test for one minute before dispatch from the works. With 0.12 in. of insulation the test may be raised to 7,000 V and the working voltage may be from 1,500 to 2,000 V. An insulation resistance of 7,000 megohms per mile is frequently obtained.

Magnesia is hygroscopic, but it can be dehydrated, and the solid drawn outer tube of the cable prevents the entry of moisture. The exposed ends may be immersed in water for several days without moisture penetrating more than a few inches. This is due to the extreme compactness of the insulation, which is consistent and not permanently damaged by a breakdown voltage test, after which it will still withstand repeated normal voltage tests. In this respect it behaves somewhat like a ceramic lightning arrestor.



"Pyrotenax" cable, showing how it can be flattened and bent without damage

The temperature to which the new cable may be subjected without risk to its inherent properties is limited solely by the melting point of the metal sheath and cores and, furthermore, as the insulation is a chemically stable oxide, it is unaffected by internal overheating due to excessive current. Indeed, the sheath has been burned away by flame without interrupting the live twin inner circuit. Also, it has been demonstrated that sufficient electrical overload to ignite normal rubber-insulated cable will not make "Pyrotenax" connected in series with it hot enough to singe paper closely pressed upon it.

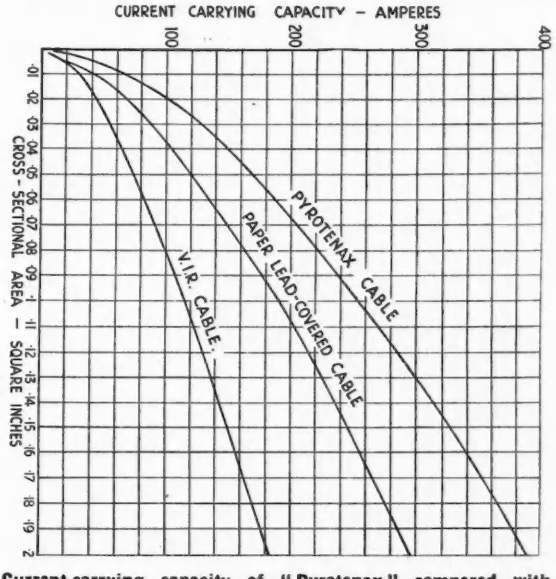
The heat conductivity of magnesium oxide insulation is fifteen times that of oil-impregnated paper, so that hot spots are not feared. A 0.003 sq. in. cable will carry 60 A (20,000 A per sq. in.) with a temperature difference between core and sheath of only 2.4 deg. C. When carrying the same current in an ambient temperature of 16 deg. C. the sheath temperature is approximately 100 deg. C. Quick heat dispersal enables current density and voltage drop to be selected on a basis of average load, and the slight a.c. sheath loss can be neglected.

The accompanying graphs illustrate the materially increased current carrying capacity of the new type of cable, which is made with up to seven cores and in coil lengths ranging from 73 up to 287 yards. For example, conductors of 0.002 sq. in. area and 0.051 in. diameter are rated at 26 A single-core and 18.5 A three-core, as compared with 5 A for equivalent v.i.r. and paper-insulated types, the voltage drop for 100 ft. per 10 A being 4.17 V and the overall diameters 0.219 in. single-core and 0.354 in. three-core.

"Pyrotenax" cable can be readily bent, even through 90 deg. by hammering it when gripped in a vice; or flattened by hammering it down to a thickness equal to half its initial diameter, without damage in both cases. It is of smaller diameter than equivalent armoured lead-covered cable.

Since the insulation is not affected by heat, these cables may be bunched together without reducing the capacities of individual circuits. The ability to bend them sharply, combined with rigidity, permits them to be invisibly embedded in the joints of finely dressed stone walls.

These new cables are laid in the usual manner and are connected in the ordinary way to standard types of switches and other fittings. Insulating ferrules support exposed ends of conductors. They are fixed with watertight sealing compound into the sheath and project sufficiently to provide adequate leakage surface between conductors and sheath. Watertight glands are employed for entry into boxes and fittings to maintain the high conductivity of the copper sheath for earthing purposes. These special glands make it possible to use



Current-carrying capacity of "Pyrotenax" compared with p.i.l.c and v.i.r. cables

(Pyrotenax ratings (single core) based on 40 deg. C. temperature rise on sheath; p.i.l.c. and v.i.r. ratings from I.E.E. Regulations for single-core cables)

"Pyrotenax" cable for earthed concentric wiring where the sheath is not only earthed but is used as a return conductor.

Such a system is allowed by the I.E.E. Regulations for the Electrical Equipment of Buildings when (*a*) it is connected to the secondary side of a transformer, or convertor, and is so arranged as to be electrically insulated from the public supply system; or (*b*) approved by the Electricity Commissioners for connection to a particular supply system; or (*c*) the supply is obtained from private generating plant.

At the factory of Pyrotenax, Ltd., at Hebburn-on-Tyne, which we visited this week, this class of cable can be seen applied in many different ways, namely, buried in concrete and under a roadway, suspended overhead, for supplying power to electric furnaces, &c.

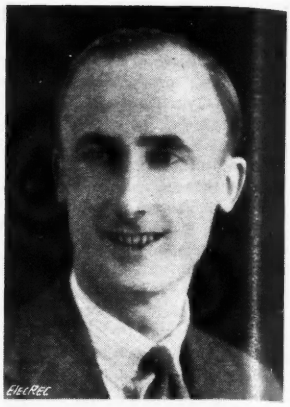
By the use of high resistance alloys a similar form of construction can be employed for making heating units.

Private houses in England have been wired with this new type of cable. It has also been used in public buildings, theatres and stores; in merchant ships and the French Navy, by railways, in mines, factories and engineering works, including the powder weighing shop of a cartridge works where previously artificial light was not permitted.

Operational Efficiency

By G. V. Harrap

Some thoughts on personnel and management



THE efficiency of use of any apparatus or system is not entirely dependent upon purely technical perfection. In many applications the disposition of apparatus, its relation to other equipment, and the use of ancillary gear will have a marked effect upon the operational success of the whole system. This dictum is applicable to the engineering problems of generation and distribution, the complexities of the commercial side, and to management.

It is not proposed to deal with the techniques by which increased efficiency is obtained in the operating of apparatus and systems. Rather is it hoped to indicate various means whereby increased efficiency of operation in various sections of electricity supply can be effected.

Increased efficiency can often be effected through the delegation of authority and responsibility. Many authorities recommend the elimination of all actual constructive work from the duties of men in charge of departments, and demand co-ordinating ability in its place. Specific instances are charge and mains engineers, who do not concern themselves with actual details of operation, but co-ordinate the efforts of others. The old-time charge engineer in overalls and complete with sweat-rag and a handful of tools, is giving way to the engineer who walks about in a dust coat, supervising the work of his assistants on the electrical and mechanical sides. It is important to note here that these assistants are gradually being given more and more of their superior's original authority, reference being made to the senior official in cases of appeal and need. It is an old axiom of management that the chief executive deals only with policies and his assistants handle the details. So it is in many modern power stations, only the principle has been put into operation lower down the scale.

In the electricity supply business, as in others, the delegation of responsibility to the right men tends to more efficient running; it frees the "chief" from irksome detail and encourages junior engineers to fit themselves for higher positions. But will the chiefs of the future be engineers or men trained exclusively for management?

Responsibility and Efficiency

It is becoming increasingly evident that in the promotion of operational efficiency, an official must be given complete charge over the whole of the kindred gear with which he is dealing. An example of this is the protection engineer, who deals with all relays on the system, whether they be in power or sub-stations. Another instance is that of the control room engineer, who should be solely responsible for all the switchgear and other apparatus appertaining to the electrical side. Some undertakings give him control over all the main electrical equipment in the station, but complete control of the switchhouse, together with responsibility for making equipment safe to work upon, is the minimum requirement.

These examples show the very important aspect of operational efficiency; *i.e.*, complete responsibility. Instead of the divided authority whereby no official is sure of his position, but is conscious of his limitations, the engineer or other official is able to visualise the whole of the operation of the gear in his section. Speedier and safer work is a natural corollary, and this obviously results in greater efficiency. It is remarkable how far down the ladder this examination of divided responsibility and elimination of detail work has to proceed. A control room engineer is only one of the lesser officials, but he should have such assistance as will enable him to devote his whole energies to controlling the operations of the power station, rather than having his attention diverted by detailed repetition work.

The moral behind the last sentence is applicable to many of the positions in the supply industry. Men with departmental responsibilities and many of the senior officials under them should be free to concentrate upon supervision, direction, guidance, and mapping out of policies. Some technical men there must be who concern themselves with detail, but they are specifically employed for that purpose. We are dealing here with those posts which have in the past carried some detail work, but which it is now being appreciated should be divested of such diversions of the engineer's ability. Greater results will be obtained from a department where the head, and maybe some of the senior officials, *e.g.*, charge engineers, are endowed with a full responsibility coupled with such an arrangement of their duties that they can efficiently supervise the men who work under them.

These considerations naturally lead to an examination of incentives, promotion, and working conditions. There is no doubt that engineers who have graduated up from lower positions feel considerably happier when they at last reach an administrative position where full responsibility is expected. It is in their own interests, and that of the employer, that the junior men should know that promotion is possible. Still better is it for the undertaking to clearly lay down, within limits to cater for the exceptional young engineer occasionally thrown up, the line of promotion. This statement invites some thought on the working conditions and aspirations of these junior officials.

Under modern conditions a far keener and better-equipped type of engineer is being produced and fitted into these positions. Most employers are keen to get hold of these good men, but they themselves, in return for the advantages gained thereby, should appreciate the better conditions which are necessary to attract and keep these junior men. It is notorious that young men want to push ahead, and although it is almost impossible to fully satisfy some of their ambitions yet a definite promotional system will tend towards satisfaction. The promotion scheme should include a number of steps, so that the young engineer can be encouraged to work and use more energy than that for which he is paid, so that he can travel along the road set out.

The Fear of Routine

Sometimes it is felt that the modern well-trained young engineer is scornful of undertaking the many repetitive duties attaching to most jobs. Such may be true, but it should be realised that this distaste has another reason behind it. Many keen young engineers are prepared to carry out a good deal of routine and repetitive work for the sake of learning all about their job. Some few realise the added necessity for doing this work so that in later years, when they come to executive posts, they will the better appreciate and understand the work of their subordinates. But any spirited technical man will eventually feel that a prolonged continuance of such work will prostitute his talents, deaden his perception, and militate against the true and proper development of his personality. Junior officials naturally desire work where they can both acquire experience and use their initiative.

For the best type of young engineer a clearly defined path of progress acts as a stimulant to greater output. Operational efficiency is definitely enhanced, for the man does not merely sit back and carry out his routine duties, but puts all he has into his job, keeping his eye on the future prospects. This demands a dispassionate appraisal of these future prospects.

Many assistant charge engineers and control-room engineers will not be able to progress further than their immediate superior's position. The same is true of assistant mains engineers, and many other positions, although there is the betterment of moves from small to large undertakings in the background for some of these. These expressions may sound pessimistic, but the increasing reorganisation of the supply industry is bound to damp down the prospects of many of the present young engineers. Perhaps even more influential is the growing tendency towards departmentalism and its consequent prevention of movement from one function to another.

Engineering and Management

Generation is developing a set of engineers who will be specialists in its problems; distribution will be similar. It is becoming apparent that the commercial side is drawing less and less upon the engineering profession and is producing a class of men versed and trained in its own technicalities. The financial side of an undertaking has not, and never had, a great attraction for young engineers, and, in any case, both engineering and finance are separate full-time professions.

In the past the management side of an undertaking was open to all aspirants from any of the above-mentioned sections. Gradually the "generating" men were cut out, or at least cut down, and the "distribution" men obtained more scope. In the last few years financial matters have assumed far greater importance, and although it is true to say that most managers are primarily engineers, yet they must give most of their attention to financial and commercial problems. Many are thereby forced to rely upon their financial and commercial departmental chiefs, though they act as true administrators and co-ordinate the work and suggestions of their subordinates.

It is gradually being realised more and more that the management side of an undertaking is becoming a specialised branch of engineering. In the competitive industries the practice of taking promising graduates from universities and training them exclusively in management and administration work is growing increasingly common. There is no doubt that there is now a definite science of management and it is possible that it will develop into such a profession that it will not brook combination with any other. The problems of the supply industry, being in some ways non-competitive, may be different from other industries which do not serve as public utilities. But that is the rub; are they different?

Must it be that in future young engineers will start off on their careers with the knowledge that, at the most, they will become departmental chiefs? Granted that the prizes of such positions are, and probably will be more, lucrative, engineers are not entirely actuated by such incentives. A few of the younger engineers who are trying to measure the future prospects at the top are equipping themselves with management and administrative knowledge in addition to their purely technical attainments. Is it, however, to any good purpose?

Will it be that in future the industry will be ruled by men who have been trained exclusively in management, acted as assistants to present-day chief engineers, and then put in full control? Or will it be that capable young engineers who are sufficiently far-sighted to see the necessity of acquiring theoretical knowledge of management will be given the chance to obtain practical training in service with a successful present-day "chief" so that eventually they may take over the guidance of an undertaking?

Much will depend in the near future upon satisfactory answers to these questions, for not only will they affect the operational efficiency of engineers at present engaged in the various sections of the industry, but they may affect it very considerably in the future, depending upon the type of managers eventually given control.

More Mercury Lighting in London

THE new street-lighting scheme of the Borough of Deptford, when completed, will be the largest street-lighting installation of mercury-vapour discharge lamps in the metropolitan area, and the largest in the world employing the new 80- and 125-W types. The thoroughfares have been graded into four classes, viz., main thoroughfares, through traffic routes, secondary roads and residential roads.

Nearly 2,000 lamps are being installed in fifty miles of streets. These comprise 1,032 80-W "Osira" lamps for twenty-six miles of streets (B.S.S. Class G), 565 125-W for fourteen miles (B.S.S. Class F), 225 250-W for six miles of through traffic routes (B.S.S. Class E), and 172 400-W units for four miles of main roads (B.S.S. Class D). The lanterns are the G.E.C. "Fulham Di-fractor" type for the 250- and 400-W lamps, and a smaller type of the same lantern incorporating an inner dome and outer bowl refractors for the 80- and 125-W lamps.

Top: Graham Road, Hackney, lighted by "Osira" lamps in "Di-fractor" lanterns. Below: The old and new lighting at Pomeroy Street, Deptford, and one of the new ferro-concrete standards, with 25-ft. overhang, for 250- and 400-W mercury electric-discharge lamps in "Fulham Di-fractor" lanterns

The spacing of the units, which are staggered on each side of the road, averages 150 ft., the spacing being modified at road bends, junctions and intersections. The mounting heights are 25 ft. in main thoroughfares and through traffic routes and 18 ft. in the secondary and residential roads. The columns, which were designed by the G.E.C. and made by the Stanton Iron Co., are of spun ferro-concrete, which is said to be less liable to fracture than ordinary concrete. The base of each column has accommodation for chokes, condensers, time switches and service connections.

The complete installation was designed by the G.E.C. in collaboration with the London Electric Supply Corporation, Ltd., and Mr. H. M. Lawson, borough engineer and surveyor. On October 5th the Mayor of Deptford (Councillor H. A. Waldegrave) officially switched on the new lighting in a number of streets. When the mains are laid for the public lighting electricity will be available from the supply company to all residents in Deptford.

On the same day the Mayor of Hackney (Alderman H. W. Butler) inaugurated an improved system of street lighting in that metropolitan borough.

The whole scheme of modernisation, which is nearing completion, comprises the relighting of twenty-three miles of main traffic roads to B.S.S. Class E, nineteen miles of secondary roads to conform to Class F, and seventy-two miles of residential streets to Class G standards, with suitable grading of the lighting at junctions of secondary and residential roads with main traffic routes.

One thousand G.E.C. "Di-fractor" lanterns have been erected at a mounting height of 25 ft. and suitably spaced to accommodate the 400-W "Osira" high-pressure mercury-vapour lamps which are to be installed over the twenty-three miles of main thoroughfares. These are already in operation in many of the principal roads where an a.c. supply is available, but pending the complete change-over from a.c. to d.c. which is now taking place, in certain streets 500-W "Osram" lamps in "Di-fractor" dual-purpose lanterns are being temporarily used. Side street lighting has in the main been carried out by "Osram" lamps installed in "Holophane" fittings.

The complete scheme was prepared under the direction of Mr. P. Holt, the borough engineer and surveyor, the installation being carried out by direct labour under the direction of Mr. E. A. Mills, the borough electrical engineer.

Meetings and Discussions

The institutions, associations and societies are now commencing their 1937-38 session and this week we again begin to report their proceedings. Mr. A. C. Gardner, president of the Institution of Engineers and Shipbuilders in Scotland, visited Canada during the summer and in his address gave an account of some things that interested him there, particularly hydro-electric developments. The case for the Diesel-electric propulsion of ships was put forward by Mr. G. T. Shoosmith this week in a paper before the Institute of Marine Engineers. The "Mechanicals" have arranged a symposium on lubrication which concludes to-day (Friday); several electrical men are presenting papers.

An Engineer's Impressions of Canada

THE presidential address of Mr. A. C. Gardner to the INSTITUTION OF ENGINEERS AND SHIPBUILDERS IN SCOTLAND on October 5th recalled impressions he had formed while in Canada this summer.

Starting with the importance of the St. Lawrence River as a means of transport and grain export, the president mentioned the electrically operated locks on the Welland Ship Canal, the fifty miles of electrified harbour railways in Montreal and a bridge across the St. Anne River in Quebec Province at La Perade of the continuous plate girder type with six spans each of 107 ft. and all welded throughout.

The president passed on to consider waterways as agents of power, stating that Canadian rivers were estimated to be capable of providing 44 million h.p., of which rather less than 8 million, or 18 per cent., had so far been developed, principally in the eastern provinces of Ontario and Quebec.

The chief supply agency in the Dominion is the Hydro-Electric Power Commission of Ontario, which controls the Niagara system, with an aggregate capacity of 1,090,000 h.p., of which 560,000 h.p. is generated in the power plant at Queenston, the largest installation in Canada, which the president proceeded to describe briefly. He expressed interest in the erosion that had occurred on the vanes of a turbine as the result of water action. In quite a number of instances the steel had been eroded to a depth of 1 in. or more on a whole group of vanes which had previously necessitated the entire renewal of the runner. Latterly, however, very successful experiments had been carried out by a welding process in an effort to build them up and retain them in use. One had been completed and put into operation and gave every indication of being highly satisfactory. It was work requiring no small amount of skill, and a staff was being trained expressly for that purpose.

The prominent place now occupied by Canada's mineral industries was in large measure due to the availability and low cost of hydro-electric power, which had made possible the economic working of low-grade ore deposits and contributed much to the development of the pulp and paper industry which bulked very largely in her export trade. Nothing seemed to have marked the industrial activity and development of Canada so much as the use she had made of her reserves of hydraulic power, and if the output of electrical energy was any criterion of that activity, then the fact that it had quadrupled itself in the last twenty years was a very promising and hopeful sign of her commercial and industrial future.

Marine Diesel-electric Propulsion

SOME operating results of Diesel-electrically propelled tugs, paddle boats, ferries and special purpose vessels are given by Mr. G. T. Shoosmith (English Electric Co., Ltd.) in a paper read before the INSTITUTE OF MARINE ENGINEERS in London on October 12th.

Comparisons are made between Diesel-electric, direct Diesel and steam machinery as regards economy, space and weight. The author gives a clear idea of the advantage of a low speed propeller for towing and states that, in general, the advantages of electric drive are more marked when the load is subject to rapid variation.

The author's company has put one particular design of engine to very diverse applications, thus proving that the steadier the load and speed the better the results. On such a duty as that of a tug, with wide variation in speed and power and the added stresses and changes in temperature due to reversing, an arduous condition is imposed on the engines with frequently high liner wear and general rapid deterioration. This is largely overcome by utilising electric drive, and while this cannot always be justified economically the results obtained, and detailed in this paper, indicate that in some circumstances a strong case can be made for this form of drive.

Water Power in Canada
Diesel-electric Ships
Lubrication

An effort is being made to reduce engine-room noise and forced ventilation is being tried; also engine driven water pumps have, with advantage, been replaced by vertical spindle motor driven pumps. In the author's opinion the provision of an automatic contactor starter for the steering gear is essential.

In the *Framfield* double-armoured lead-covered cable was employed for all propulsion circuits, which was rather difficult to run neatly in the confined space available. In the *Robertsbridge* use is being made of a special type of hard rubber cotton-braided and impregnated cable which is much lighter, more easily run and less bulky. This cable has also been used in the *Talisman* and can be recommended for all vessels, especially in home waters.

One feature of Diesel-electric vessels that requires considerable care is the governing system, which has imposed upon it very rapid and severe forces.

The *Wuppertal* is the first example of the commercial application of Diesel-a.c. and the fact that five other medium and large vessels, for cargo and passenger service, are at present being built in Germany is an indication that in at least one country this form of propulsion is considered to hold out advantages for a type of vessel hitherto quite outside the orbit of Diesel-electric drive.

With the a.c. system the difficulty lies in the regulation of speed and, to a lesser extent, in manœuvring. The German vessels' engine speed is varied to suit the requirements. This can be arranged with multi-engined systems by means of remotely operated governor control.

Particularly for large liners, where the auxiliary load is appreciable and the distances between generating plant and point of use are considerable, the a.c. system has possibilities on the score of light weight, ease of maintenance, efficiency and lower first cost. Since a.c. propulsion can offer no appreciable advantages unless use is made of medium or higher engine speeds its further development would seem to be bound up with Diesel engine design.

A line of development that is receiving strong support in Scandinavian countries at present is the fitting of a magnetic clutch, and in conjunction with reduction gearing, to connect as many as four engines to one shaft.

Modern Lubrication Practice

WITH the support of twenty-nine British and ten overseas societies and technical organisations the INSTITUTION OF MECHANICAL ENGINEERS is holding a three-day general discussion in London this week (October 13th to 15th) in an endeavour to establish some correlation between the theory of bearing design and trade practice in the use of lubricants.

A series of 140 papers from all parts of the world is being presented and, to illustrate the subjects under discussion, an exhibition has been organised at the Science Museum, South Kensington, which will remain open for a fortnight. The proceedings end with the annual dinner of the Institution to-night (Friday).

Group I papers, on journal and thrust bearings, include contributions on synthetic resin bonded bearings by Mr. P. Beuerlein (Hamburg) and Mr. G. R. Syssen (Hydro-Plastics, Ltd.). Fabric bearings for rolling mills are dealt with by Mr. H. Rochester (Metropolitan-Vickers Electrical Co., Ltd.) and Mr. E. W. Smyth (Taylor Bros. & Co., Ltd.). These bearings are lubricated with water, as are also those made of rubber as described by Messrs. S. A. Brazier and W. H. Bowyer (Dunlop Rubber Co., Ltd.) and A. Fogg and S. A. Hunwicks (National Physical Laboratory).

Lubricating systems for steam turbines are discussed by Mr. J. P. Chittenden (English Electric Co., Ltd.), who makes special reference to the fire risk; Mr. R. Dowson (C. A. Parsons & Co., Ltd.) considers tilting-pad thrust bearings, and Messrs. H. L. Guy and D. M. Smith (Metropolitan-Vickers Electrical Co., Ltd.) summarise certain aspects of the current practice of the six principal turbine makers. The requirements for turbo-generators of very large sizes are outlined by Mr. C. R. Soderberg (Westinghouse Elec. & Mfg. Co., Philadelphia).

Group II papers are concerned with the lubrication of engines of various kinds and the purification of oil. For instance, Mr. L. H. de Langen (Philips' Gloeilampenfabrieken, Holland) describes the application of magnetic filters to lubricating systems for continuously removing metal particles from the oil.

Group III papers deal with industrial applications, including cutting fluids.

Mr. G. F. Shotter (North Metropolitan Electric Power Supply Co.) describes the results of tests related to the lubri-

cation of pivots and jewels in electricity meters; while conditions encountered in wire drawing are discussed by Prof. F. C. Thompson (Manchester University) and Dr. R. Goodacre (Bruntons, Musselburgh, Ltd.).

Group IV papers, on properties and testing, include a study of wear by the electron diffraction method by Prof. G. I. Finch and Dr. F. D. Zahoorbux (Imperial College of Science and Technology, London).

Electricity Helps Colliery Prosperity

IN his address as incoming president of the South Wales Branch of the Association of Mining Electrical Engineers at Cardiff on October 9th Mr. J. Vaughan Harries declared that it was not unfair to claim that the returning prosperity of the coalfields was in no small measure due to electricity. While a good proportion of the thousands of pounds being spent on the electrical development of collieries in South Wales would go on winding, haulage and ventilation, pumping, cleaning and screening, he thought the time was ripe for further and more extensive use of electricity in mines. There were still several services electricity could render, valuable not only from a business point of view, but also as a substantial contribution to health and safety and making mining, and mining life, more congenial and in keeping with modern progress. For example, coal cutters and conveyors were the cause of much dust, and it appeared that there was a large field awaiting exploitation in the collection of dust in headings and main roadways. It was doubtful whether it would be possible to find a miner who would prefer to win his coal by the assistance of the paraffin lamp in preference to the high candle-power electric lamp. Electricity must not be condemned out of hand, but every effort must be made to understand its elements and its safe usage. Mr. Harries referred to the surprising lack of electric welding plant in South Wales collieries. Where such plant had been installed, managements spoke highly of its value, he said. The power factor was, generally speaking, between 50 and 60 per cent. The plant was easily portable and could be used at any point of the colliery premises.

A National Fuel Policy

THE uneconomic conditions which now exist in Great Britain with regard to the administration of the utilisation of various forms of fuel in general and coal in particular were drawn attention to in the presidential address to the Institute of Fuel in London on October 14th by Sir Philip Dawson, M.P.

A permanent central advisory body should be created through which the whole of the fuel activities of the country would be co-ordinated. The smoke nuisance called for drastic attention. In spite of years of intermittent agitation, nothing was done officially from the viewpoint of conservation of those coals which were responsible for the nuisance, and which comprised our most valuable asset. Laws applied to the industrial chimney should, in some degree, be extended to the domestic chimney as this would be the only means by which smokeless fuel would be burned in the domestic grate. This, of course, could only be done if the Government gave greater facilities for the production of the fuel required. This did not mean that the Government was called upon to erect carbonising plants throughout the country, but it should encourage the industry to supply the fuel itself. A step in this direction had been made in the assistance given for the installation of low temperature plants in South Wales.

Linked up with plants for the carbonisation of these coals would be central installations for treating the by-products, and a comprehensive production plan should be worked out so that a situation was not developed which would cause overproduction of any one commodity and lead to depressed markets. Power generating stations should be considered as part of the scheme in so far as they could be installed to utilise smokeless fuel obtained from coals which give a coke unsuitable for domestic purposes, but which could be carbonised for recovery of their valuable smoke constituents. The question of gas production and distribution was also involved.

Furthermore, a central advisory body might consider the possibility of operating steam and power generating units in connection with iron and steel works as separate undertakings linked up with the grid, supplying power and steam to the works and purchasing any surplus gas from them. This arrangement might overcome the present general wastage of gas at week-ends when the works and mills were idle.

Electricity Supply and the Law

IN outlining some of the legal aspects of the public supply of electricity for power purposes during his presidential address to the North Wales Sub-Centre of the Association of Mining Electrical Engineers at Wrexham last Saturday, Mr. Alan S. Thwaites asserted that probably no industries were so tied up with legal restrictions and regulations as the mining and electricity supply industries.

Briefly tracing the successive steps which must be taken to obtain statutory powers to supply electricity, Mr. Thwaites spoke of the purpose and scope of the special Acts of Parliament and Electricity Special Orders.

Referring to non-statutory undertakings, Mr. Thwaites said that it was not generally known that any new private generating station must comply with regulations prescribed by the Electricity Commissioners as regarded system pressure and frequency, but such regulations must not affect the efficiency and economical working of the business for which the generating station was required. In the case of authorised undertakers the Commissioners had an absolute veto on the construction or extension of a generating station: in the case of a private concern there was no veto.

The recent legislation relating to meter testing, the rating of statutory undertakings, the "St. Pancras decision" (under which a consumer occupying premises partly in the area of one undertaking and partly in another might use electricity supplied by one undertaking throughout the entire premises), and the future reorganisation of the electricity supply industry, particularly with a view to the distribution side, were other topics touched upon by Mr. Thwaites.

The Future of Electricity Supply

MR. HERBERT G. WILLIAMS, M.P. for South Croydon (who is also executive director of the Incorporated Association of Electric Power Companies) gave an address on the future of the electricity supply industry at a meeting of the Croydon Rotary Club on Tuesday last. Mr. Williams referred to the appointment of the McGowan Committee, and said that its Report was a very valuable and informative document. It was followed by a lengthy memorandum in which the Government expressed its views as to the lines on which it thought legislation should proceed. That memorandum was presented to the industry and the nation as a basis for discussion. It did not have a very good reception.

In the discussions there would be a good deal of argument as to the relative merits of municipal and private enterprise. He was a believer in private enterprise, but he also believed in recognising existing facts. Three-fifths of the electricity supply in the country was in the hands of the municipalities, and whether that was good or not, the bulk of it would continue to be controlled by them. It was quite clear that in any legislation which would be passed the great municipalities would retain their undertakings and in some cases would absorb adjoining undertakings. The problem was not going to be that of the great urban centres, but that of enabling the people living in the more thinly populated districts to have the great advantages of electricity supply.

The McGowan Report was based on information up to the end of March, 1934, but since then companies and municipalities supplying electricity had increased their consumers by a number equal to the total number of telephone users. In three and a half years the electrical industry had done what the telephone undertaking had taken since its inauguration to accomplish. The industry on which the Committee reported was not that which now existed, so rapid had been the progress, and he suggested that it was dangerous to reform something which was making more progress now than any other industry in this country or any other country.

He was a little dubious as to whether they wanted any new legislation at all. They had to go carefully when progress was so amazing. What was to be done? He was opposed, he confessed, to enterprises which were too large, and he criticised on that ground the unification of the railways in 1921, the formation of the Central Electricity Board in 1926, and the setting up of the London Passenger Transport Board. He contended that the Bill establishing the Central Electricity Board was not necessary. On the other hand, in dealing with electricity, there were a number of undertakings which were really too small, for a variety of reasons.

If a company had to supply a thinly populated area it was bound to lose money for the first few years and needed a prosperous area behind it to modify the risk. Small undertakings could not undertake the risk, nor were they in a position to pay the salaries for the kind of men needed to develop the industry. They must have undertakings sufficiently large to take the risk of development, to finance proper staffs and to finance publicity and showrooms, an integral part of development. There was a case for reducing the number of undertakings to bring them to a size economically large enough to give satisfactory service.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Mr. Parkinson's Appeal

Will you be so good as to allow me to address your readers in the interests of the men and women engaged, non-manually, in the electrical industry?

This year I am honoured to be President of the Electrical Industries Benevolent Association which exists to help all such persons who are needy and deserving and to help their dependants. Every week there are new cases brought to our attention; those who need help consequent on severe illnesses, or who are past work and have no pension, the ageing widow whose late husband's pension died with him, the wife whose husband is incapacitated from work and who has the problem of looking after him and bringing up a family on a pittance which is all that relatives have to give. These and many other hardships are relieved.

I should like to ask that your readers will inform us at 6, Southampton Street, W.C.1, of any deserving case of which they hear; often those who merit help most are the most shy of asking for it. This is the first part of my Presidential address.

Secondly, I ask your readers to send a gift to the E.I.B.A., here and now, before they forget. The E.I.B.A. is *their* Association and a considerable income is needed straightway if its budget this year is to be balanced.

London, W.C.1, *October 6th.* FRANK PARKINSON.

[We refer to this letter in our Leader section to-day.—EDS. ELEC. REV.]

Earth Leakage Trips

I have noted in the interesting article by Mr. T. C. Gilbert, in your issue of September 24th, a statement that a trip coil with a winding of less than 28 or 30 s.w.g. is likely to have a short life. I feel, however, that there is some error here because assuming a d.c. resistance of 200 ohms the weight of bare copper wire of 30 s.w.g. would amount to nearly 1¼ lb. for this resistance.

Since Mr. Gilbert's reasoning is based on a wire of at least this gauge for safety purposes, I would suggest that some further statement should be made in regard to the design of the coil because such a weight could not possibly be accommodated in most of the leakage breakers available.

Stretford, *October 10th.* W. H. LAWES.

In reply to Mr. H. G. Taylor's letter in your issue of October 8th, I think it should be clear that any person or animal to be protected against leakage potential is invariably connected in parallel with the leakage trip, and is thus subjected to the same increase in resistance due to poor earthing conditions as the trip-coil circuit.

I showed in my article that a well-designed leakage trip will operate against zero earth resistance with a potential of from 12 to 15 V, and a person seated in a bath connected to public water supplies is thus adequately protected. Should this person and bath be transported to a country district, where earthing conditions are such that the best electrode resistance cannot be brought below 800 ohms, then obviously there is no need for the trip to operate below 65 V, as the person's resistance will have risen in even greater degree.

To state that 30 V represents the safe limit of leakage potential and then to apply this to a person in a bath and also to any other person standing on the dry sands of the Sahara desert seems to me to be faulty reasoning; clearly the latter person could be subjected to some hundreds of volts leakage potential without danger. This ability of the leakage trip to adjust itself to the conditions prevailing is, of course, one of the reasons why I consider that it is the ideal method of protection.

In reply to Mr. Jack, I agree that the conditions are as he states, but a study of contemporary German technical literature will show that in similar cases engineers in that country insert an insulating section in the water pipe. I have dealt with this point in these columns. T. C. GILBERT.

Folkestone, *October 9th.*

Standard Fuses

The issue of "British Standard Specification for Electric Fuses" (No. 88/37), which supersedes No. 88/31, has placed many fuse manufacturers in a difficulty. The rupturing capacities now called for require tests which are only within the reach of very large firms possessing their own high power plant.

Seeing that the National Physical Laboratory at present is not able to make tests even approaching those now called for, it would have been helpful had the authorities who are identified with the compilation of the Specification given some indication as to where the necessary tests might be made at a reasonable cost, and where the testing certificate might be available, as such certificates are now being demanded by many intending customers.

As matters stand now, the cost of testing to 25,000 kVA is quite out of reach of manufacturers not having the power available, and they are thus placed at a considerable disadvantage compared with the larger firms. CHAS. W. COX.

Liverpool, *October 8th.*

Water Heating in America

With reference to the article on "Water Heating in America" in your issue of October 1st, unless due allowance has been made for the difference between the English and American gallons, anyone who wishes to use the information may be misled. G. W. LEADER.

Middlesbrough, *October 7th.*

[The brief article was abstracted from the *Electrical World* and presumably the gallons are American. The American gallon is equivalent to 231 cu. in., while the English one is about 277 cu. in., or approximately 20 per cent. greater.—EDS. ELEC. REV.]

Too Much Light?

In the article on "Lighting" in your issue of October 8th you refer to our indirect lighting unit with a 500-W lamp as a "domestic" unit. While it is true that we have a smaller model taking up to 200-W lamps which is suitable for the average domestic interior, the 500-W size is used principally in offices or shops of considerably larger floor space. It is therefore misleading to use it in support of the "Better Light—Petter Sight" campaign.

We believe in better light in the true sense of the phrase, but in practice it is too often interpreted only as "brighter light" which may mean "blasted sight," not to mention a "blasted bank balance." G.V.D. ILLUMINATORS, LTD.

G. V. DOWNER, *Managing Director.*

London, W.C.2, *October 8th.*

What is the Explanation?

I have noticed the effect mentioned by Mr. G. W. Leader in his letter under this heading in your issue of October 8th and have always surmised this to be due to the washing effect of rain-water, brought about as follows.

In wet weather the wire collects rain-water and sheds this in fairly large drops all along its length and these produce the resultant clean effect immediately below. This clean area is widened by the swaying of the wire and deflection of drops by wind, but I am not aware that any use can be made of the effect.

Exeter, *October 9th.* W. N. LAVIS.

["F.L." (London, N.W.) puts forward a similar explanation to this.—EDS. ELEC. REV.]

SALESMANSHIP.—While we welcome correspondence from our readers on any subject relating to the profession and industry we regret that we are unable to take action on anonymous communications. If "A Disgusted Group of Experienced Salesmen" care to conform to the ordinary rules we shall be pleased to hear from them, and will, in accordance with our invariable custom, treat any information that they may desire to place before us in the strictest confidence.—EDS. ELEC. REV.

Two Electrical Dances

At the Electrical Engineers' Dance to be held at the Grand Hotel, Harrogate, on Friday, November 12th, music will be provided by Conri Tait's Band, commencing at 8 p.m. Dinner will be served at 8.30 p.m. Applications for tickets should be made to Mr. W. R. T. Skinner, hon. secretary, Electrical Engineers' Dance, 36, Park Place, Leeds, 1. As a result of the dance it is hoped to hand a donation to the benevolent fund of the Institution of Electrical Engineers.

The annual dance of the North Eastern Centre of the Institution of Electrical Engineers will be held at the Grand Assembly Rooms, Newcastle-upon-Tyne, on Friday, November 5th. Tickets (3s. 6d. each) can be obtained from Mr. J. Kernsley, 44, Queen's Road, Jesmond, Newcastle-on-Tyne. The dance is being organised by the Students' Section of the Centre.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Iron-clad Switchgear

The range of iron-clad flat control units manufactured by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has been extended by the addition of a smaller size.

These units consist of a d.p. main switch with fuse and a distribution board combined. In the larger sizes the switch fuse is rated at 50-A, and the distribution board has one 30-A way for the cooker and from three to eight 15-A ways for lighting and heating. The new smaller sizes are made with a 40-A switch-fuse and either four 15-A ways (to which can be added a 30-A way) or five 15-A ways. In all cases interconnections are provided.

The unit is fitted with two lids; one covers the main switch-fuse and is interlocked, while the other covers the distribution section and is not interlocked. In the new 40-A size these lids are hinged at the side instead of the bottom, thus saving space. The small sizes are provided with undrilled detachable end plates at top and bottom, providing yet another useful feature. The unit is illustrated below (Fig. 6).

The overall dimensions are approximately 10¼ in. high by 11⅜ in. wide by 4 in. projection.

Vacuum Switch of Inductive Loads

Because the necessary contact separation of a vacuum switch for a few thousand volts is only a fraction of a millimetre such circuit-breaking equipment has had a successful run within the limits dictated by its inherent bad behaviour in producing surges on inductive load. Such switches open in two of three microseconds and no arc is formed, so that 20,000-30,000-V may be induced. SUN-VIC CONTROLS, LTD., 1, Kingsway, London, W.C.2, have now overcome the limitation to the uses of their hot-wire vacuum switch by the incorporation of a surge suppressor consisting of a material having a voltage-current characteristic such that the current varies approximately as the fourth power of the applied voltage. Thus the suppressor dissipates the stored energy and the switch merely interrupts the circuit (Fig. 2).

The new equipment consists of a vacuum switch and a small block of the special material connected in parallel with the main contacts. At normal voltages the material passes a few milliamperes and is virtually an insulator. The current in the material rises instantaneously with the rise in voltage until the current passed is equal to the original load, and the voltage therefore does not rise beyond the value corresponding to this current. Thus, in a particular case of a switch carrying a load of 20 A at 200 V the current in the suppressor at this voltage might be 10 mA. On the circuit breaking the voltage would rise instantaneously to the value at which the suppressor would pass 20 A, viz., $200\times(20/0.01)^{0.25}=1{,}350$ V. Thus, the peak volts would not exceed 1,350, a figure well within the British Standard Specification for industrial equipment of this type.

Improved All-wave Oscillator

A recent addition to the range of instruments made by the AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Street, London, S.W.1, is an improved all-wave modulated oscillator suitable for service engineering or general laboratory work (Fig. 5).

Six separate coils cover a continuous fundamental frequency band from 100 to 30,000 kilocycles, range changing being accomplished by a simple rotary switch. The dial is directly calibrated in frequencies on all ranges, an extra scale being calibrated to the second harmonics of the highest frequency band. A comprehensive attenuation system is provided consisting of a four-position step attenuator and continuously variable slide wire. The output impedance is low and constant over the full rotation of the slide wire.

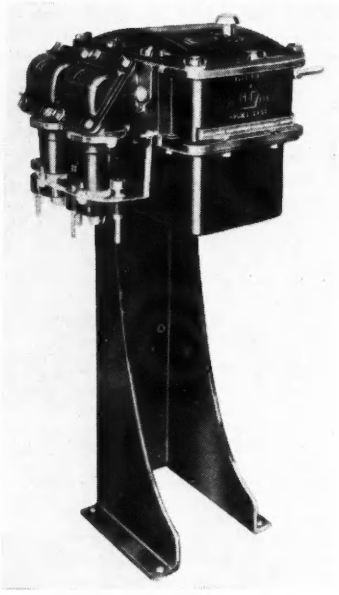
The maximum r.f. output is one volt, and owing to the special design of the oscillator system this output is maintained within reasonable limits over the full frequency range covered

by the instrument. A separate l.f. oscillator valve provides internal modulation at 400 cycles at a depth of about 30 per cent., sockets being provided from which the low-frequency signal can be taken for l.f. amplifier checking, &c.

If required, externally modulated or pure r.f. signals can be obtained, the selection being made by means of a rotary switch. The oscillator is completely screened and provided with a special low-capacity screened output lead, thus reducing stray field and enabling a low minimum signal to be obtained. The instrument is self-contained and portable, the batteries being readily accessible for replacement.

Flameproof Circuit-breaker

A 40-A oil-break flameproof circuit-breaker is the latest development in the range of switchgear of this type produced by GEORGE ELLISON, LTD., Perry Barr, Birmingham, 20. The breaker has passed the tests applied by the Buxton Testing Station of the Mines Department to apparatus for use in atmospheres liable to become charged with methane, petroleum or acetone vapours. In its design are incorporated the recent recommendations of the Mines Department. The use of a free handle prevents the contacts being closed against the automatic releases. The breaker can be opened instantly by depressing a prominent push-knob on the cover. The switch case, cover and oil tank have wide, smooth-machined flanges and are bolted solidly together to form an explosion-proof enclosure. It may be mounted on stands or skids, or may be bolted to a wall, machinery or roof support.



The Ellison circuit-breaker

An isolator embodied in the switch case is operated by a spanner. It is interlocked with the breaker handle, cover and oil tank. The breaking capacity is 1,500 kVA at 440 V, three phase, 50 cycles. The cable fittings are each provided with a detachable sealing pot that enables the wireman to clamp and seal the cable before taking it to site and allows it to be detached from the breaker without unsealing.

Convector Heaters

Newcomers to the electric convector heater field are the INTEROVEN STOVE CO., LTD., 156, Charing Cross Road, London, W.C.2. The apparatus which they have recently introduced has either 1- or 2-kW elements operating at black heat. Cold air is drawn in through grilles at the base, passes over the special heating channel and is projected through louvres at the top. An illustration appears on the previous page (Fig. 7).

A Photo-electric Colorimeter

An improved form of photo-electric colorimeter (Fig. 4) is manufactured by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, at the company's Salford Instrument Works. Its purpose is to enable quick objective measurements to be obtained independently of the sight qualifications of the individual. The chief advantages claimed are high sensitivity, robustness, a wide range of quantities of solution which can be measured (*i.e.*, 1 to 100 c.c.), direct-reading scales showing absorption and extinction values, and a gain in performance due to the large output of the rectifier photo-cells employed as compared with alkali cells.

The instrument comprises a lamp and two similar glass containers, together with a pair of matched photo-cells. There are two methods of using the instrument, by comparison or by deflection. In the first the absorption of one of the liquids is known, and the relative absorption (and so the concentration, etc.) of the other is determined from a calibrated galvanometer. This method is more accurate than the other and requires no standard curves, but it is not so quick.

The deflection method is employed with highly coloured or dull solutions, which give deflections over ten divisions. It is quick and has low sensitivity to disturbance. The least sensitive adjustment of the galvanometer is used, and so fluctuations in the brightness of the lamp are scarcely noticeable. The centring of this lamp is easy, as the zero point is very stable. Both containers are filled with 100 c.c. of water or solution medium, and the instrument is connected to the supply; ten minutes is allowed for the heating of the lamp. After adjusting the zero the right-hand container is replaced by another containing the solution to be tested. If the deflections are small, the more sensitive range is chosen. Sometimes complementary colour filters are needed in order to increase sensitivity.

As an example of other applications, the amount of iron in solutions of organic pigments, such as wine, can be determined. Where the actual absorption values are of less interest than values compared with standard products, *e.g.*, the clarity and colour properties of oil, the photo-electric colorimeter is suited for continuous control in production; thus white oils that appear similar to the naked eye may show differences of twenty divisions.

Balanced Lighting

At a recent sales dinner held by CROMPTON PARKINSON, LTD., Bush House, London, W.C.2, the company's "Neophan" lighting was introduced and demonstrated by means of comparative cabinets and a spectroscope. We noticed that objects illuminated by lamps housed in "Neophan" glass fittings stood out much more sharply and were richer in colour toning. The effect being complimentary to the complexion, this type of lighting is eminently suitable for use in ballrooms, restaurants, &c.

There is a deficiency of red in the rays of tungsten filament lamps which tends to make it difficult to discriminate between colours; daylight filters absorb 40 per cent. of the light and are too hard. "Neophan" glassware, into which neodyn in oxide form has been introduced, absorbs part of the yellow rays, so that when this light is examined through a spectroscope there are two decided dark lines in the neighbourhood of 0.6μ, thus producing the light quality referred to.

This glassware is made up in the form of nine pendants and one ceiling-type fitting, including the "Nottingham" unit, which is shown in Fig. 1 (p. 531).

Warming Plates

A range of electrically heated warming plates has recently been announced by HEATRAE, LTD., Norwich. The thick aluminium top plates have a matt surface which gives effective heating. The handles are heat-insulated, and rubber feet are provided. The body can be obtained finished in aluminium, nickel plate, or chromium plate, and the four sizes available, 18 in. by 9 in., 24 in. by 9 in., 30 in. by 12 in., and 36 in. by 12 in., have loadings of 200, 400, 500, and 600 W respectively. One of these warming plates is illustrated on the previous page. (Fig. 3).

Measuring and Testing Instruments

Among the instruments recently introduced into this country by KANDEM ELECTRICAL, LTD., 769, Fulham Road, S.W.6, is the "Kapavi" portable capacity measuring bridge with five ranges extending from 0.00002 to 10 μF. The bridge elements, comprising mica condensers, resistances, calibrated scale, range change-over switch and phase compensator, are housed in a black-moulded insulated case, 8 by 4½ by 2½ in., weighing 2½ lb. Only one circular scale of 210 mm. is used. A built-in adjustable phase-compensation resistance permits of sharp tuning of the minimum sound when carrying out measurements on leaky condensers. The limits of error are stated to be ±2 per cent. of nominal value +0.000005μF.

A second case contains an 800-cycle buzzer and 4.5-V flash-lamp battery. Any suitable a.c. voltage may be used instead of the buzzer, provided that no more than 4 V is impressed across the plug sockets of the bridge. A 200-ohm earphone acts as galvanometer.

Another instrument is the "Pyropto" partial radiation optical pyrometer for ascertaining temperatures between 700 and 3,500 deg. C. of a glowing mass in annealing and calcining furnaces or in forging and rolling. The intensity of brightness is compared with that of a lamp filament with colour filter (at temperatures over 900 deg.) fed from an alkaline battery, the voltage being calibrated in deg. C.

The "Tolavi" has been designed for insulation testing without a hand generator, a 500-V d.c. supply being obtained from three pocket-lamp batteries via a buzzer transformer. Insulation values are indicated on the scale of a cross coil ohmmeter by pressing a knob. Failure of the batteries causing the voltage to drop below 450 V is shown by the fading of a neon lamp. The dimensions of the black metal case are 8 by 5 by 3¼ in. and the total weight is 4 lb.

Two new fires, by the Simplex Electric Co., Ltd. (left) and Berry's Electric, Ltd.

NEW BOOKS

Lectures on the Mathematical Theory of Electricity. By F. B. PIDDUCK. Pp. 110; figs. London: Oxford University Press. Price 7s. 6d.

This small book is an abridgement of a course of lectures delivered to mathematical students and is intended to supplement other reading, thus it does not claim to be either a balanced or a complete treatment of the subject. It is essentially for students working under a teacher. The opening sections treat of static electricity and magnetism, while the main part deals with electro-magnetic theory, leading up to Maxwell's equations and some of their applications. The author does not attempt to deal fully with the more modern parts of the subject, but the treatment is not devoted entirely to classical theory. Here and there the more practical sides are touched upon, such as a.c. networks, transients or the theory of the transformer. The book will be found very useful by all who are interested in the theoretical side of electrical science—particularly those who regard mathematics as an essential or cultural part of their training.

Theory of Alternating-Current Machinery. By A. S. LANGSDORF. Pp. 788; figs. 570. London: McGraw-Hill Publishing Co. Price 36s. net.

The appearance of an addition to the large number of books on the theory of a.c. machinery needs some justification. Has the author something new to tell us? Does he present known facts and theories in a novel manner? Has he co-ordinated hitherto scattered matter in an orderly presentation of the latest theories? In this volume these conditions have been fully met.

The first three chapters deal respectively with current and voltage relations in single-phase circuits, the complex quantity, and polyphase circuits. The remaining ten chapters embrace theoretical studies of the transformer, synchronous machines, induction machines and commutator motors. Finally, numerous problems are set bearing upon the text of each chapter. The general plan adopted is, first, a qualitative analysis of the physical relations inherent in the structure of the machine; secondly, the representation of the entire complex of these relations in graphical form; thirdly, the translation of these graphical relations into analytical form; and lastly, the algebraic development of the quantitative relations between the magnitudes embodied in the analytical expressions.

In the chapters on rotating machines the outstanding feature undoubtedly is the treatment of induction motor theory by the method of inversion, which, incidentally, is a valuable one for the study of all kinds of a.c. circuits. There is also a simplified treatment of fractional-slot armature windings, a simplified presentation of the Doherty-Nickle extension of the two-reaction theory of synchronous machines, a new extension of the two-reaction theory of the synchronous motor, an analysis of asynchronous machines which includes a proof of the equivalence of squirrel-cage and commutated windings, a new presentation of the theory of concatenated induction motors, and a complete treatment of the single-phase induction motor.

Very full use has been made of graphical illustrations, particularly of vector diagrams, with great gain to the book, while mathematics do not exceed the simple calculus standard. This well-produced book may be regarded as a definite acquisition to electrical engineering literature.

Indian Water Power Plants. By Prof. SHIV NARAYAN. Pp. 172; figs. 40. India: Bry Narayan, Poona. Price Rs. 5s. (8s.).

While India is in the throes of finding her Provincial self-expression, the electrical industry renders a somewhat unpleasant climate tolerable to all who dwell in the cities. The great voiceless multitude of agricultural villagers will have to wait a long time for these blessings, but a beginning has been made with rural industries in several provinces where plentiful water power is available. Some day electro-chemical industries may also mature, for India is rich in raw materials. In the north the crops are to a great extent dependent upon irrigation canals, and, where these are below the level of the land to be served, pumping by power generated from the canal falls is often used to raise the water either from tube wells sunk in the supersaturated subsoil or from the canal itself.

The distribution grid of Mr. Stampe's Ganges canal rural industries scheme covers 10,000 sq. miles, and the much criticised Uhl River scheme, supplying a similar area in the Punjab (at a cost according to Prof Narayan of no less than 7 crores or 70 million rupees) has 213 miles of 132-kV transmission. This is a State enterprise, as also is the railway system, in which electrification has already made a good start. Neither the index nor the text mentions Col. B. C. Battye, the originator and constructor of the Uhl scheme; and the same remark applies to many other European names well known in connection with Indian projects. On the other hand, granted that this is a companion volume to "Hydro-electric Installations of India" by the same author, it seems hardly necessary that the earlier compilation should be mentioned over forty times in the first seventy pages. This blemish is more noticeable in that the official report of the Hydro-electric Survey of India is barely mentioned and not indexed at all; whereas most of the more recent installations which the author either describes or quotes descriptions of (including the aforesaid Uhl or Ool, the discovery of which he wrongly places in 1922) originated in that volume.

The table of costs of Indian schemes is not very informative, as apparently these include the works beyond the power house; stated in rupees per kilowatt for the hydraulic layout and power house, they would be really useful as a basis of comparison. Although loosely constructed and open to much criticism in detail, this volume will be found useful as a book of reference.

Radio Engineering. By F. EMMONS TERMAN. (Second edition.) Pp. 813; figs 475. London. McGraw-Hill Publishing Co. Price 30s.

The first edition of this work by the Professor of Electrical Engineering at Stamford University, which appeared five years ago, presented a comprehensive textbook for engineering students of the phenomena of modern radio communication. The first part deals with the fundamental properties of tuned circuits and valves, and the second part with radio receivers, transmitters, wave propagation, antennas and direction finding. In planning the book the author has made a point of "carrying the reasoning along in terms of physical concepts and words and by writing down an equation only when the equation itself is of importance." The use of mathematics is thus less in evidence than is usually the case in a comprehensive engineering textbook of this sort, though this does not mean that the analysis is less deep than is customary.

In this edition the book has been extensively rewritten so as to cover the rapid development that has taken place in recent years, a chapter on television has been added, and, to make room for this and other additions without undue increase in length, a chapter on measurements has been omitted. Problems are given at the ends of chapters, and an effort is made to include at least one problem on every important aspect mentioned in the text. Great care has been taken with the compilation of these problems which form an important part of the book from the teacher's point of view. A bibliography mainly of authoritative American articles, is given in footnotes to fit in with the text. Space is not given to historical matter so that the book is confined to the principles of valve working and their up-to-date applications for communication.

This work should form an important addition to the library of the radio engineer and the teacher of radio engineering.

Principles of Engineering Advertising. By C. W. HANSON. (68 pp., ill.). London: Morgan Bros. (Publishers), Ltd. Price 3s. 6d. net.

The unscrupulous and fantastic claims which appear in so many advertisements nowadays have, as Mr. D. A. Bremner, of the B.E.A., says in a foreword to this little book, made a joke of "truth in advertising." Engineering firms, however, who appeal to a more discriminating class must keep rigidly to the rule which makes engineering advertising an entirely different art. Mr. Hanson amply demonstrates this in his book, and deals in a readable way with the various aspects of the subject—policy, planning, agencies, budgeting, media, copy and layout, catalogues, etc. We are particularly interested in the chapter on "Press Liaison" which stresses the importance to the advertiser, as well as to the trade newspaper, of preserving editorial independence in dealing with matter relating to advertisers' products and activities.

Shorter Notices

"Stores Accounts and Stores Control," by J. H. Burton (Sir Isaac Pitman & Sons, London, 10s. 6d.), has now reached its third edition. It has been not only revised but considerably enlarged. New chapters deal with such additional phases of the subject as wholesale, retail and factory stock; stores and stocks of local authorities; codification; purchasing technique; technicalities of housing and handling stores and stock; new systems of recording; and sorting methods. Several new sections have also been included on financial points relating to control of stores and stocks.

The Incorporated Radio Society of Great Britain has recently issued the fifth edition of "A Guide to Amateur Radio" (6d.). Chapters dealing with ultra-high-frequency apparatus and television have been included for the first time, while subject-matter contained in other sections has been revised and new diagrams added. Those dealing with transmitters, receivers, aerials and valves have been rewritten. General subjects such as the morse code, useful formulæ and international prefixes are also dealt with and details are given of the methods of obtaining artificial and full radiating aerial licences.

The Autocar Handbook (13th edition). Pp. 226; illus.: 280. London: Iliffe & Sons Ltd. Price 2s. 6d. net. This very useful handbook has been largely rewritten to bring it up-to-date, and chapters are devoted to both the ignition and the lighting and starting systems, a praiseworthy feature being the excellent sketches that are used to convey to the lay reader the technical information necessary for a full understanding of the electrical equipment, while the text is well-balanced between the purely technical and the practical.

"Elementary Engineering Science," by A. Morley and E. Hughes. Pp. 290; figs. 158. London: Longmans, Green & Co. Price 3s. 6d.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

The Shoe and Leather Fair

A typical indication of the extent to which manufacturers have come to appreciate the economy and convenience of the individual electric drive was provided by the equipment on view at the International Shoe and Leather Fair held last week at the Royal Agricultural Hall, London. Among the numerous tanning processes for which the aid of electricity has been called in are pressing, sole leather rolling, embossing, ironing, staking for gloving leather, boarding, graining, polishing, glazing, shaving and sammying. Examples of machines for all these processes were to be found on the stand of the Turner Tanning Machinery Co., Ltd., much of whose pressing, embossing and ironing equipment incorporates electrically heated platens. Push-button control is employed on all the larger apparatus. Other specialists in tanning machinery exhibiting were Edward Wilson & Son, Ltd., Johs Krause, and G. L. Murphy. The easy starting and stopping of electric motors make them especially applicable to shoe making and repairing and they are now used very extensively on such machines as sole sewing, stitching and finishing apparatus, presses, rollers, skivers, channellers and rounders. Apparatus of this type was shown by Keats & Bexon, Ltd.; E. Mills & Co. (Kettering), Ltd.; Planets, Ltd.; A.T. Ralphs (Norwich), Ltd.; Singer Sewing Machine Co., Ltd.; Spicer Machinery Co., Ltd.; Standard Engineering Co., Ltd.; and Whitfield, Hodgsons & Brough, Ltd. Special equipment shown by the British United Shoe Machinery Co., Ltd., for making leather goods and raincoats was representative of other applications of electricity.

Street Lighting Conference, Hull

A street lighting conference organised by E.D.A., was held at the Hull Corporation Electricity Showrooms on October 13th. The object of the conference was to interest officials of street lighting authorities, chairmen, members of Councils and Lighting Committees, and others concerned in the administration of public lighting. About 500 invitations were sent to nearly 100 local government authorities in the East Riding of Yorkshire, Lincolnshire and Nottinghamshire. Mr. N. L. Harris gave a lecture on "The New Era in Electric Lighting," in which he reviewed, with demonstrations, the development of carbon filament, vacuum filament, and tungsten filament gas-filled lamps, which he compared with the recently introduced 80-W high-pressure mercury vapour lamp with quartz tube. Mr. R. Maxted spoke on "Modern Street Lighting," and illustrated his remarks with the film which was recently shown at the Public Lighting Conference and the Safety First Conference. These were followed by a discussion which was opened by Mr. J. N. Waite, borough electrical engineer, Hull. After tea the visitors were taken by coach to inspect twelve street lighting installations in and about Hull.

Preventing Industrial Accidents

The annual congress of the Safety-First Association was held last week and the proceedings included a visit to the Home Office Industrial Museum. Delegates were welcomed by the Home Secretary, Sir Samuel Hoare, who referred to the fact that last year there were 175,000 accidents in British industrial establishments (about 1,000 of them fatal) a large proportion of which might have been prevented. A special inquiry into accidents to young workers had shown that in four out of five fatal accidents someone was to blame. The enforcement of the requirements of the new Factory Act would necessitate a considerable increase in the number of inspectors, but much more could be done by the inculcation of knowledge of the probable causes of accidents and the best way to avoid them. In conclusion the Home Secretary stressed the value of good lighting as a means of preventing accidents; statistics had shown that accidents were considerably more frequent during winter when a greater proportion of the work was done by artificial light.

A display of "Magicoal" fires at the Worthing Electricity Department's showrooms

G.E.C. Southampton Branch

The new branch premises of the General Electric Co., Ltd., in Commercial Road, Southampton, have now been opened. In 1912 the company opened a branch at 24, High Street, later transferring to accommodation of a more extensive nature at 149, High Street. Latterly it has been obvious that more commodious premises should be acquired if the interests of the company were to be served by the branch in the most efficient way. The outcome has been the acquisition of a corner site in Commercial Road, one of the main thoroughfares of the town, and a short distance from the Central Station and Civic Centre. The new building can be seen clearly from many parts of the town and at night presents a striking spectacle with its installation of neon tubing dominated by the trade mark initials of the company. The ground floor is allocated to showrooms at the front and to a trade counter, general stockrooms and a loading dock at the rear. On the first floor are offices, another showroom and demonstration room, as well as stockrooms. The second floor, with the exception of a section assigned to servicing work, is wholly set apart for stock purposes. Additional facilities are also available for liaison work between the company's staff and those who are concerned with the solution of electrical installation problems.

The new branch premises of the G.E.C. at Southampton

Italian Radio Industry

It is reported that 110 works are now engaged in the radio industry of Italy, of which forty construct complete receivers and the others individual parts. About 10,000 persons are occupied in the industry, and of these 400 are engineers. The capital invested amounts to about 200 million lire, and the value of production is 250 million lire per annum.

An Electric Fire Display

The accompanying illustration shows a window display which has recently been installed at the Worthing Corporation Electricity Department's showrooms by Berry's Electric, Ltd. The giant "Magicoal" fire, which can be seen in the centre of the window, is being used in similar displays throughout the country, and has proved a great attraction.

Industrial Co-partnership

The annual meeting of the Industrial Co-partnership Association will be held at Caxton Hall, Westminster, S.W.1, on October 19th, and will be followed by a discussion on "The Position of Profit-sharing at a time of Industrial Activity."

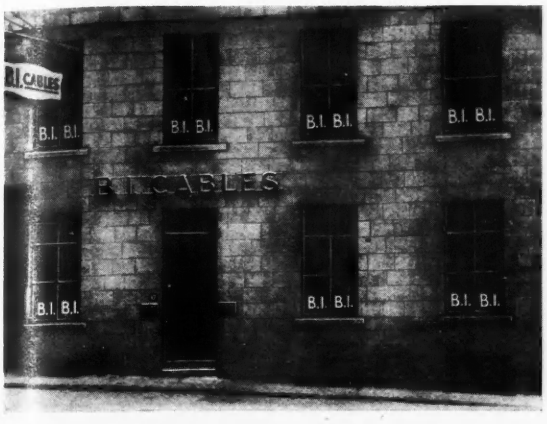
"Straightening Your Load Curve"

This is the title of a publication which is being distributed by the International Refrigerator Co., Ltd., exclusively to the chief engineers of supply authorities. It contains a mass of interesting information relating to refrigeration, including reasons why the supply authority should sell refrigerators, with a table appended indicating the comparative value per

kW demand of various appliances, a map showing the potential market, and details of how to sell refrigerators.

Household Electrical Appliances in U.S.A.

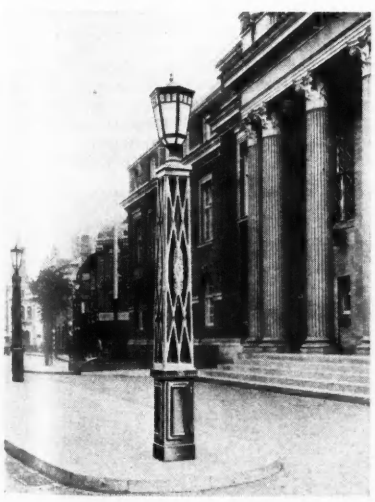
The manufacture of household electrical appliances in the United States has not only made up all depression losses but is well on the way to establishing new production records, according to the New York Trust Co., quoted by *Reuter's Trade Service*. The rise in sales, which are well above those for 1929, is chiefly attributed to the greater amount of cheap electricity available, rising consumer purchasing power, continued improvements and reduced prices for the appliances themselves. During the present year the expanding production and increased sale of electrical appliances which were features of 1936 have proceeded at, if anything, an accelerated rate. For the first seven months of 1937, as reported to the National Electrical Manufacturers' Association, representing 92 per cent. of the industry, sales of refrigerators totalled 1,867,000, a gain of 17 per cent. on the 1,599,000 for the same period in 1936. Sales of electric washers for the first half of the year rose from 761,000 to 852,000. Sales of electric ranges by a group of twelve manufacturers increased from 158,000 to 226,000 in the same period, their value rising from $10,938,000 to $16,034,000; water heater sales by another group of manufacturers showed a gain of 48 per cent. in number and 51 per cent. in value, and sales of floor vacuum cleaners increased by 27 per cent. in number and 25 per cent. in value; hand vacuum cleaners rose by 48 per cent. in number and 47 per cent. in value. A continuation of the improvement is expected.



The new branch offices and stores which have recently been opened at 17, Exchange Street, Aberdeen, by British Insulated Cables, Ltd., Prescot

Washing and Ironing

We are informed that the wringer of the H.M.V. clothes washer, referred to in our last issue, is not now made interchangeable with an ironing attachment. Experience has shown it to be preferable to market a separate roller ironer.



Lamp pillars supplied by Hardy & Padmore erected outside Nuneaton Town Hall

Orders Recently Booked

Hardy and Padmore, Ltd., recently received an order for the supply of lamp pillars for erection outside the Nuneaton Town Hall. These are now in place and consist of cast-iron square pillars massively constructed. A hinged door is provided in the lower portion, the electrical wires being carried by a central tube to the lantern. The lantern itself is strongly constructed, and glazed with Morocco glass.

The Motor Show

The International Motor Show commenced at Earls Court yesterday (Thursday) and it remains open until October 23rd. In connection with the exhibition our contemporary *The Autocar* produced last week a special buyers' guide number. This is being followed by a complete illustrated show report and, next week, a critical review of the display. The price of each of these special issues is 6d.

The Hotel Exhibition

At least a quarter of the stands at the Hotel, Restaurant and Catering Exhibition to be held at Olympia, London, from November 30th to December 8th will contain items of electrical interest, including such products as electric cookers, food-preparation equipment, dish washers, refrigerators, air-conditioners and fires. The British Electrical Development Association will again have a comprehensive exhibit, and the following are among the manufacturers of electrical and allied goods who will have stands:—

Amplilux Lighting & Illuminating Co., Ltd.
Bakelite, Ltd.
Balcombe, A. J., Ltd.
Benham & Sons, Ltd.
Carron Company.
Crittall, Richard, & Co., Ltd.
Driver, W. T.
Eastwoods, Ltd.
"Euk" Mfg. Co., Ltd.
Falkirk Iron Co., Ltd.
Frigidaire, Ltd.
General Electric Co., Ltd.
Guiterman, S., & Co., Ltd.
Harcourts, Ltd.
Hobart Mfg. Co., Ltd.
Hotpoint Electric Appliance Co., Ltd.
International Refrigerator, Co.
Jackson Boilers, Ltd.
Jackson Electric Stove Co., Ltd.
Kent, George, Ltd.
Lusty, W., & Sons, Ltd.
Magrini, Frank V., Ltd.
Medcalfe & Co., Ltd.
Morris Heater Appliances, Ltd.
Ozonair, Ltd.
Peerless Electrical Mfg. Co., Ltd.
Pressed Steel Co., Ltd.
Staines Kitchen Equipment Co., Ltd.
Still, W. M., & Sons, Ltd.
York Shipley, Ltd.

A Big Load

The accompanying illustration shows one of the biggest road transport jobs ever carried out at Portsmouth. The load weighed 58 tons and was part of the B.T.H. 30,000-kW turbo-alternator made at Rugby being delivered to the power station of Portsmouth Corporation.

Part of a B.T.H. 30,000-kW turbo-alternator being delivered to the Portsmouth power station

I.F.S. Electrical Imports

Imports of electrical goods and apparatus into the Irish Free State up to the end of August were valued at £764,393, an increase of nearly £120,000 over the value for the corresponding period of 1936. The principal increases occurred under the headings of telegraph and telephone apparatus, imports this year amounting to £64,221 as compared with £12,260 in 1936; broadcast receivers, fully manufactured, £59,383, as against £42,178; and "other electrical goods and apparatus," imports under this head being valued at £227,562, as compared with £180,604 in the corresponding period of the preceding year.

	January–August. 1936.	1937.
	£	£
Electric motors	35,971	38,996
Other electrical machinery	151,196	154,277
Dry batteries, complete	8,620	10,228
Dry batteries, parts of	2,795	2,510
Electric lamp bulbs	37,250	19,137
Electric lighting accessories, fittings and parts	54,897	53,203
Electric wires and cables, insulated	63,207	62,632
Telegraph and telephone apparatus	12,260	64,221
Radio receivers, fully manufactured	42,178	59,383
Radio-gramophones, fully manufactured	972	663
Other radio apparatus, fully or substantially assembled	5,311	8,096
Component radio parts and accessories	50,478	63,485
Other electrical goods and apparatus	180,604	227,562
TOTAL	£645,739	£764,393

E.D.A. Activities

Illustrations of the E.D.A. calendars for 1938 appear in the Sales and Publicity Programme of the Association for November. Attention is also drawn to "The Way to a Good Table," a new cookery book by Elizabeth Craig. This book is printed in a clear type and is covered with a waterproof material. Particulars are given of blocks, literature, &c., which the Association has available to link up with the Better

Light—Better Sight Campaign, while a new heating poster (16-sheet or double-crown) can now be obtained.

I.F.S. Lamp Quota

The *Board of Trade Journal* contains particulars received from the United Kingdom Trade Commissioner in Dublin of Orders controlling imports made recently by the Irish Free State Executive Council. These include the Control of Imports (Quota No. 34, Second Period) Order, 1937, which appoints the period November 1st, 1937, to January 31st, 1938, as the second period under the Order relating to the quotas on certain filament lamps, and fixes the quota for the period at 12,000 lamps.

For Sale

Edmundsons Electricity Corporation, Ltd., invites offers for the purchase of surplus plant.

Glasgow Corporation has for sale motor, generator, starter and control panel.

(See our classified advertisements.)

Trade Announcements

The works formerly known as the Victoria Foundry, Paisley, have been acquired by Stirling's Bitumen Products, Ltd., the managing director of which, Mr. W. T. Stirling, was previously associated with Briggs & Sons, Ltd., Dundee, as chief chemist and works manager. The company is specialising in the manufacture of bituminous and allied materials for the building, engineering, shipbuilding, road-making, electrical and other industries.

Norman Rose (Electrical), Ltd., have removed to Waveband House, 43, Lamb's Conduit Street, W.C.1. The telephone number remains unchanged.

Australian Electrical News

Our Australian correspondent reports that it is possible that the Sydney County Council may shortly have a talking film produced showing the generation of electricity in Sydney, as it is believed that such a film, screened in all city and suburban cinemas, would encourage the sale of electricity. When the matter comes up for final discussion the Council will also have before it a recommendation from the general manager that the sum of £2,522 shall be spent on advertising the advantages of electricity through commercial radio stations.

The Perth City Council recently approved the expenditure of £5,990 on additional city lighting, mainly in the new Riverside Drive, where seventy-eight 400-W mercury electric-discharge lamps will be erected at an estimated cost of £4,875, with an annual charge of £900. Similar lamps will also be placed in two other streets, and three new 1,000-c.p. lamps at main crossings.

The Government of Victoria is advertising for a chairman for the State Electricity Commission. The term of appointment will be for a period not exceeding seven years, with the right to apply for reappointment at the end of that time. The salary is £2,100 per annum.

The annual conference of the Local Government Association of N.S.W. will shortly be held, and some attention will be given to the powers held by the Main Roads Board regarding the removal of flashing signs. These signs, both on main roads and overlooking harbours and waterways, have come in for much criticism of late, and in several cases the Board has ordered their removal.

In Western Australia a by-law is at present being framed for the control of illuminated signs and hoardings. Recently an advertiser's refusal to remove an offending sign was upheld by the local Court.

Officers of the Customs Department, Canberra, are investigating a request from manufacturers of radio valves in Australia that heavy additional rates of duty or an import embargo should be imposed on all metal receiving valves. Such valves are not manufactured locally, but the Australian industry claims that it is able to produce valves of the glass envelope type which reproduce exactly the electrical characteristics of the American metal valves. Manufacturers of ultra-small receiving sets, however, protest that glass valves are too large for their requirements.

At a recent meeting of the Local Government Association of W.A. concern was expressed at the number of fatalities through electric shock in the Perth metropolitan area, and it was suggested that the Association should discuss the matter of having all electric light mains placed underground. This, however, was considered impracticable, and it was finally

[*Elec. Rev.* photo.

A "Ros-Rol" electric cooker installed at the Coventry Street Black and White Milk Bar. Over thirty of these cookers are now in use at the various bars of the Ros Rol Co., Brixton

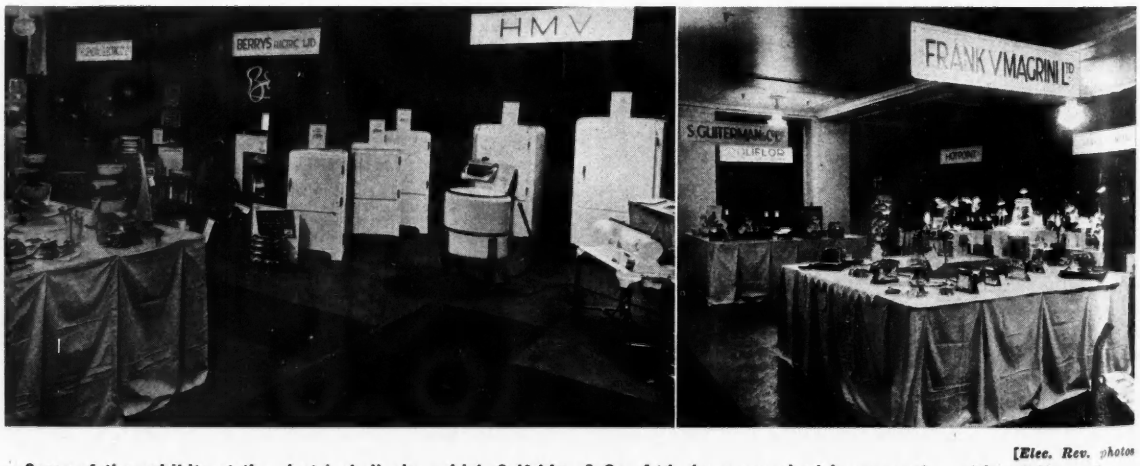
decided that all local authorities should individually attend to the matter of electric wiring to house connections in their own districts, and that householders should be asked to report immediately any electrical defects in their homes.

Municipal Trading at Dundee

A proposal is at present before Dundee Town Council to give general selling and hiring powers to the Electricity Department. At the last meeting of the Council a deputation of the local branch of the Electrical Contractors' Association of Scotland attended, and pointed out that if the Corporation were to start selling electrical appliances direct the effect on the contractors in Dundee would be "disastrous." They appealed to the Corporation to implement the undertaking given two or three years ago to confine the showrooms to exhibiting equipment and educating the public in electrical matters. It was moved that the resolution of the Corporation prohibiting the Department from selling electrical apparatus direct to consumers and from hiring or selling on the hire-purchase system immersion heaters and radiators should be rescinded. This was seconded, and a discussion followed. The debate was adjourned.

A Domestic Appliance Display

In conjunction with a "Home Improvements Week" at their Oxford Street, London, stores, Selfridge & Co., Ltd., on Monday last opened a special display representative of the latest types of domestic electrical appliances now available. While there is a good selection of such apparatus as fires, cookers, vacuum cleaners, irons and toasters, a special effort is being made to bring to the notice of the public some of the less well-known appliances, such as food mixing and beating machines, casserole cookers, food servers, tea making sets,



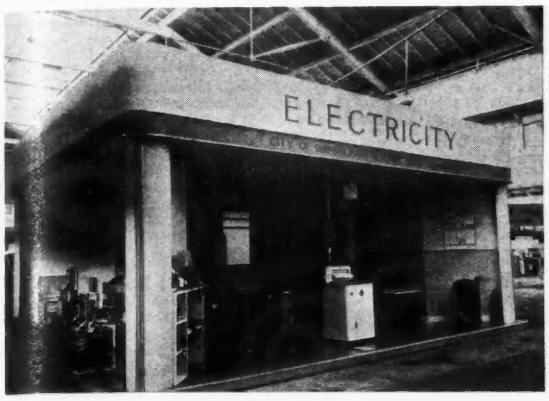
[*Elec. Rev.* photos

Some of the exhibits at the electrical display which Selfridge & Co., Ltd., have organised in connection with a "Home Improvements Week"

coffee sets, egg boilers, and shaving mirrors. Eleven manufacturers have co-operated in producing the display, namely, Belling & Co., Ltd.; Berry's Electric, Ltd.; C.C.A. (Vacuum Cleaners), Ltd.; General Electric Co., Ltd.; S. Guiterman & Co., Ltd.; L. G. Hawkins & Co., Ltd.; H.M.V. Household Appliances, Ltd.; Hoover, Ltd.; Hotpoint Electric Appliance Co., Ltd.; Frank V. Magrini, Ltd.; and Smith's English Clocks, Ltd.

Building Trades Exhibition, Birmingham

At the Building Trades Exhibition which was held recently at Bingley Hall, Birmingham, the Corporation Electric Supply Department had a large stand on which it displayed a comprehensive range of domestic electrical appliances. These included lighting fittings, electric cookers, kettles, saucepans



The Birmingham Electric Supply Department's stand at the Building Trades Exhibition, Birmingham.

and water heating apparatus as supplied on hire by the Department, also refrigerators, vacuum cleaners, washing machines and other appliances.

An Electrical Exhibition at Liverpool

An exhibition of domestic and hotel electrical appliances is being held at Francis Café, Parker Street, Liverpool, arranged by the Corporation Electric Power and Lighting Department. Among the commercial appliances is a grill similar to the old-fashioned griddle which cooks steaks and chops in three minutes, bacon and eggs in 30 seconds, and sausages in one minute, a potato peeler which scrubs ten pounds of potatoes in two minutes, a toaster which rings a bell when the toast is ready, an automatic egg boiler, a dish washer with glass-panelled door in which dirty crockery is sprayed with hot water and automatically dried, and a baking oven with interior illumination.

Colliery Fireman Fined

A colliery fireman, who pleaded guilty at Hamilton Sheriff Court on October 7th to having failed personally to couple up a cable to a detonator before a shot was fired, and also failed to see that all the workmen in the vicinity of the shot had reached shelter, was fined £3. The prosecutor said this type of offence was pretty common in the district. The brushers, who were unauthorised to do so, connected the cables to save time. They did this, as was known from experience, at the risk of life. Firemen and miners—or at least some of them—were not taking notice of the prosecutions of that Court. An agent explained that on the day of the accident a cable had broken and respondent had a number of duties to perform. As the miners were in a hurry, one of them connected the cable. Respondent had since given up his job, as he had found the duties of fireman too onerous for him.

A St. Pancras Cooker Scheme

"House full" notices appeared regularly this week outside the St. Pancras Town Hall, where the local Electricity Department, following the good examples of Poplar and Erith, held a series of dramatised cooking demonstrations in connection with the introduction of a new scheme for popularising electric cooking. "Electromagic of 1937," as the entertainment was called, was presented in an attractive manner practically identical with that employed in the previous performances at the other places mentioned, the programme comprising dance music, free gifts and teas, and a humorous sketch in which the advantages of electric cooking were cleverly "put over" with the aid of a conjurer. Actual cooking demonstrations were given by Miss Powell, of the General Electric Co., Ltd., in a friendly style which compelled attention. The opening entertainment on Tuesday afternoon was inaugurated by the Mayor of St. Pancras, Alderman R. F. W. Fincham, who outlined the objects of the scheme and paid a high tribute to the work of the borough electrical engineer and manager, Mr. Robert Lee, and his staff. The Mayor was supported by Alderman J. H. Mitchell, chairman, and other members of the Electricity and Public Lighting Committee. Under the new scheme a standard "Magnet" cooker suitable for 2-6 persons is supplied, installed and maintained free, together with an electric kettle and iron, for a small fixed weekly or quarterly charge, plus a "unit" charge of ½d. As a typical example, the average inclusive cost for a family of two adults and two children using 30 kWh for all their cooking, lighting, ironing and radio requirements would be 2s. 9d. a week paid through a prepayment meter. Between five and six thousand persons have witnessed the entertainment and the results already achieved appear likely to exceed expectations. We trust that the borough's enterprise will be rewarded as it has been at Poplar where, as a result of the similar entertainments held annually, nearly 10,000 cookers have been installed in the past three years.

"Realite" Lighting Handbook

Rowlands Electrical Accessories, Ltd., have pointed out that their handbook, mentioned by us last week, dealing with the "Realite" system of lighting, has been written in non-technical language from the shopkeeper's point of view and should therefore be of assistance to electrical traders when talking to customers about lighting schemes.

Prices of Materials

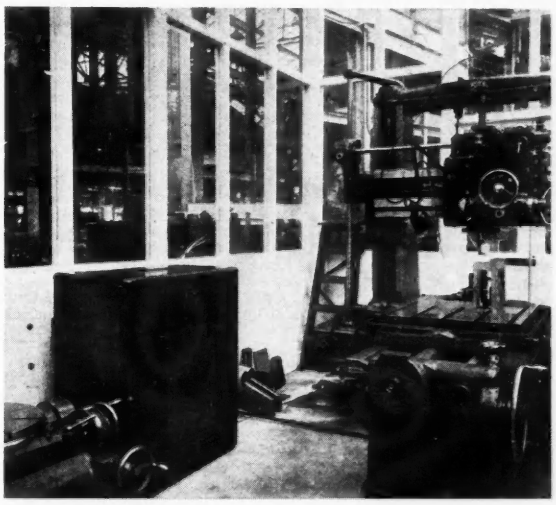
Henry Gardner & Co., Ltd., report, October 13th: Copper bars (best selected), sheet and rod, £84, £3 dec. English pig lead, £20 5s., £1 dec. Spelter, £17 16s. 3d., £1 3s. 9d. dec. English block tin, £230 10s., £12 10s. dec.

Frederick Smith & Co. report, October 13th: Electrolytic copper bars, £54, £3 dec. Ditto, ditto, wire rods, £58 10s., £3 dec. Ditto, ditto, h.c. wire, 8$\frac{13}{16}$d., $\frac{5}{16}$d. dec. Silicium bronze wire, 10$\frac{3}{16}$d., $\frac{1}{16}$d. inc.

Edward Till & Co. report, October 13th: India-rubber, Para fine, 9¼d., ¼d. dec.

An Air-conditioning Installation

One of its air-cooled self-contained units has recently been installed by Carrier Weathermakers, Ltd., in the jig boring room of the works of Supermarine Aviation Works (Vickers), Ltd., Southampton. The machine shop, outside the jig boring room was already ventilated and therefore the air is brought



An air-cooled Carrier self-contained unit in the works of Supermarine Aviation Works (Vickers), Ltd., Southampton.

in from the outside works to the unit by means of a short duct through the connecting wall. Since the installation of the unit in the jig boring room, the temperature has not varied more than 3 deg. day or night, but the supply of clean air for ventilation purposes has been ample. A 15-A power point and an opening in the wall to take the air duct were all that was necessary to complete the installation. No water or drain of any kind was required.

New Catalogues and Lists

Electroflo Meters Co., Ltd., Abbey Road, Park Royal, London, N.W.10.—Leaflet No. 83, dealing with automatic steam pressure reduction and de-superheating.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—Details of the "Mazda Photoflood" lamps, including an exposure guide in tabulated form.

Renold & Coventry Chain Co., Ltd., Didsbury, Manchester, 20.—A leaflet dealing with chain drives.

Evershed & Vignoles, Ltd., Chiswick.—A three-colour broadsheet relating to "Megger" testing outfits.

H. J. Scott & Co. (Belfast), Ltd., Volt Works, Ravenhill Avenue, Belfast.—A pocket price-list of Scott motors.

Griffin & Tatlock, Ltd., Kemble Street, London, W.C.2.—A 106-page catalogue of oil and tar testing apparatus, following as closely as possible the sequence set out in the I.P.T. handbook. A catalogue (15B ii) of laboratory balances.

Graham Farish, Ltd., Masons Hill, Bromley.—A coloured folder illustrating the company's fires.

British Insulated Cables, Ltd., Prescot.—A leaflet dealing with box condensers for power factor correction.

Curtis Lighting Co. of Great Britain, Ltd., Aldwych House, London, W.C.2.—A leaflet illustrating and describing exterior lanterns.

J. Rouse (Oldham), Ltd., Enterprise Works, Booth Street, Oldham.—"Electrifry"—claimed to be the first catalogue by a range-maker devoted entirely to electrical fish-frying equipment.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, London, W.C.2.—Catalogue No. 579, dealing with electric fires and domestic appliances.

Murex Welding Processes, Ltd., Ferry Lane Works, Forest Road, London, E.17.—A technical catalogue of "Cresta" electrodes.

Carter & Co. (Nelson), Ltd., Nelson, Lancs.—Leaflets appertaining to syrens, signalling equipment, and portable head lamps.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.—A new publication relating to workshop lighting.

C.A.V.-Bosch, Ltd., Acton, W.3.—Running instructions for a nozzle-testing outfit.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, Kingsway, W.C.2.—A catalogue of "Supreme" and "Sunray Tricity" electric heaters.

General Radiological, Ltd., 204, Gt. Portland Street, London, W.1.—Details of the "Helioscope" dual diagnostic unit and "Sinegran Fina" intensifying screens.

J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall, have adopted a special binding and larger pages for the new edition of their accessories catalogue. There are 88 pages profusely illustrated.

Private Arrangement

J. W. E. Dolman, trading as Dolta Electrical Supplies, 88, Charlotte Street, London, W.1.—The creditors of the above were called together on October 4th at the offices of Percy Phillips & Co., accountants, London, W.1. The statement of affairs disclosed liabilities of £1,347. The net assets were £308, leaving a deficiency of £1,039. A deficiency account was also submitted which showed that at April 1st, 1937, there was a debit balance on debtor's capital account of £407. Since that date there had been a net loss on the trading of £192, while the drawings had aggregated £198, and for the purposes of the statement of affairs the assets had been written down by £240. Debtor attributed his present position to bad debts, lack of working capital and extreme competition. The creditors decided that the estate should be administered under a deed of assignment in favour of Mr. Percy Phillips as trustee. A committee was also appointed consisting of the three principal trade creditors.

Bankruptcy Proceedings

C. Street, 164, Preston Old Road, Blackpool, Lancs (trading as Fylde Crystal Lamp Co.), formerly carrying on business at 55, Coronation Street, Blackpool, as an electric lamp distributor.—The public examination was held at the Court House, Blackpool, recently, and according to the statement of affairs filed there were ranking liabilities of £473 and a deficiency of £453. Debtor said he entered into partnership with another at Blackpool, where they commenced trading as agents for an electric lamp firm in London. Shortly after commencing the business, debtor found that the lamps they were selling were of inferior quality. Although they were guaranteed for 1,000 hours, some only burned for 100 hours, and others would not burn at all. Eventually the producers said they were proposing to make better lamps, and debtor released his partner and took over the business on his own account. Referring to the stock of lamps, debtor said they had been marked up to 4s. each, but actually they were not worth more than 5s. a dozen. The examination was adjourned.

A. E. Barrow, 95, Swaine House Road, Five Lane Ends, Bradford, formerly 217, Huddersfield Road, Low Moor, Bradford, formerly radio and electrical dealer.—The first meeting of creditors was held at the Official Receiver's Office, Hallfield Chambers, 71, Manningham Lane, Bradford, on October 5th. Debtor had prepared a statement of affairs showing ranking liabilities of £352 and assets of £39, leaving a deficiency of £313. He attributed his failure to insufficient working capital, adverse judgment in an action for damages involving heavy costs, loss by forced sale of stock and effects, bad debts, and illness of his wife. The case being a summary one was left in the hands of the Official Receiver as trustee.

L. C. Rowse, 20, Western Place, Penryn, Cornwall, formerly 60, Lower Market Street, Penryn, Cornwall, radio and electrical engineer.—The first meeting of creditors was held recently at the Official Receiver's offices, Truro, when the statement of affairs disclosed a deficiency of £557. Debtor attributed his failure to overbuying of stock and loss on resale, depreciation of wireless sets, losses sustained on hire-purchase transactions and heavy trading expenses. The case was left in the hands of the Official Receiver as trustee.

H. Yewdall, 573, Meanwood Road, Leeds, electrician.—A deficiency of £139 was disclosed at this public examination, held on October 5th at the County Court House, Albion Place, Leeds. The debtor stated that he first commenced trading in 1905 in partnership with another, but later worked on his own account. In 1922 he had to close the business owing to a nervous breakdown, but after eight years he recommenced trading. Last year he had another breakdown and lost money because he was unable to complete a contract. The business was closed in September. The examination was adjourned for formal closing.

L. A. W. Steinmetz, 56, Bromham Road, Bedford, electrical dealer.—The public examination herein was held at the Shire Hall, Bedford, recently, when a statement of affairs was submitted showing liabilities of £1,293 and assets of £298, leaving a deficiency of £995. Debtor attributed his failure to bad debts and lack of capital. The examination was adjourned.

E. A. Cartwright, radio dealer, 8, Heskey Street, Nottingham, lately trading at 71, Melton Road, West Bridgford, Notts.—First meeting October 15th at 22, Regent Street, Park Row, Nottingham. Public examination November 4th at the County Court House, Nottingham.

F. G. Arthurton, radio dealer, Gordon Avenue, Thorpe St. Andrew, Norfolk, lately carrying on business at Norwich and Great Yarmouth.—Public examination October 19th at the Shirehall, Norwich.

J. R. V. Webb, electrical contractor, 35, Kelston Road, Whitchurch, Glam.—Last day for receiving proofs for dividend October 19th. Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C.1, Official Receiver.

W. Gallagher (Driver Bros.), radio, electrical and cycle dealer, 14, Ivegate, Yeadon, Yorks.—Trustee, Mr. G. Hylton, 10, East Parade, Leeds, appointed October 4th.

E. B. Clendinnen, radio dealer, 111, Wolverhampton Road, Stafford.—Receiving order made October 6th on a creditor's petition.

Company Liquidation

Charlton Higgs (Radio), Ltd.—Winding up voluntarily. Liquidator, Mr. A. W. Dalling, 1, Pavilion Buildings, Brighton.

Electrical Progress in China

THE report on economic and commercial conditions in China (Stationery Office, 1s. 3d.), prepared for the Department of Overseas Trade by Sir Louis Beale, Commercial Counsellor at Shanghai, was written before the outbreak of the present disturbances in China, under conditions which did not point to an imminent dislocation of trading. The period covered—April, 1935 to March, 1937—marked the change from depression to a revival of prosperity. The value of imports from abroad had declined from $2,002 million in 1931 to $919 million in 1935, and of exports from $1,070 million in 1929 to $535 million in 1934. In 1936 imports were slightly better than in the preceding year and exports were almost 35 per cent., higher than in 1934. When the report was being written there was clear evidence that the trough of the depression had been passed.

In the machinery import trade the most important single item is that of textile machinery, the value of importations being $14 million in each of the last three years, and $7 million in the first three months of 1937. Of this the United Kingdom was the largest contributor in 1934 with 52 per cent., but with only 13 per cent. in 1936 gave way to Japan, whose figures had risen from 38 per cent. to 81 per cent.

Other leading machinery imports (in order of value for 1936) were boilers and boiler room equipment, $5 million (United Kingdom 50 per cent.); turbo-generators, sets and parts, $3 million (Germany 51 per cent., United Kingdom 11 per cent.); and electric motors and parts, $2 million. Miscellaneous metal imports valued at $53 million in 1934 had dropped to $46 million in 1936, but in the first three months of the current year reached $13 million. The United Kingdom's share of this trade fell from 15 per cent. in 1934 to 10 per cent. in 1936, while the corresponding figures for the United States and Germany rose from 19 per cent. to 37 per cent., and 27 per cent. to 29 per cent., respectively. Leading items in this group (in order of value for 1936) were scientific instruments, $8 million; radio sets and parts, $4 million; insulated wire, $2½ million; electrical fittings, meters and lamps and telephones and telegraphic instruments and parts, $2½ million; and electric cables, $1½ million.

Considerable progress was made during the period under review in the provision of long-distance telephone and radio-telephone services, and the use of telephones generally is becoming increasingly popular. Up to the end of November, 1936, ninety-one telegraph offices, six wireless telegraph offices, seven local telephone offices and ninety-four long-distance telephone offices had been established. Twenty-five long-distance telephone lines, with a total length of 7,600 km., were opened during the year connecting most of the principal cities of Central China. Wireless telephone communication between Canton and Shanghai was inaugurated in December last and the nine-province long-distance telephone system is now almost complete.

The manufacture of electrical goods and appliances is one of the most successful of new industrial ventures in China. An important branch is the manufacture of electric lamps, and since 1925, when only one lamp factory was established, fourteen other factories have been opened, in addition to a large American concern. The annual production of Chinese lamp factories is estimated at 15 million lamps, and this with the 5 million produced by the foreign establishment, meets the bulk of China's present demand. Of the raw materials used in this industry, however, only the glass and lead are procured locally, but as China is the chief tungsten producing country it follows that plant for the manufacture of filament wire will eventually be opened. Electric fans, motors and in fact almost the complete range of electrical appliances are made in China, to the growing exclusion of the imported product.

Incorporated in the report is a statement published by the Chinese Maritime Customs which gives a list of factories in operation in the Shanghai area at the end of 1934. From this we have extracted the following information relating to electrical works:—

Electric welding	43	Electric generators and motors ...	8
Electrical supplies	22	Neon light tubes	6
Electric batteries	16	Wireless sets	3
Electric lamps	15	Other electrical industries	3
Electrical instruments	12		
Flash lights	11	Total	139

Electricity Supply

Lighting, Domestic, Power

Argentina.—ELECTRICITY AND WATER SUPPLIES THREATENED.—A *Reuter* message from Buenos Aires states that the city's electricity and water supplies are threatened by the extraordinarily low level to which the River Plate has fallen. The level is the lowest for seventeen years and Buenos Aires residents have been asked to economise in the use of both services.

Barrow-in-Furness.—RURAL SUPPLIES.—In view of a proposal for the heating of Rampside Church by electricity and requests for supplies of electricity for several farms in the neighbourhood the Electricity Committee proposes to erect an overhead line from Rampside Road to a point near Peasholmes Farm and low-voltage lines from this point to Peasholmes and Moss Side and other farms in the neighbourhood at an estimated cost of £725 for mains, switchgear and transformer.

Batley.—PRICE REDUCTIONS.—Approval has been given by the Town Council to reductions in electricity charges which will benefit consumers by £2,400 a year. The lighting flat rate will be 3¾d. instead of 4d. per kWh; "unit" charge under the rateable value tariff, ½d. (at present ¾d.); and cooking and heating flat rate, 1d. (1¼d.) per kWh. It has been decided to include a new rate of 2d. per kWh for outside and advertisement lighting.

Belgian Congo.—LAYING A CABLE ACROSS THE RIVER CONGO.—After several failures owing to the width and speed of flow of the River Congo, engineers of the Société des Forces Hydro-electriques de Sanga and of the Société des Ateliers de Constructions Electriques de Charleroi recently succeeded in laying a cable in and across the bed of the river for the transmission of power from the generating station at Leopoldville to Brazzaville, in the French Congo. According to *Eclairage et Force Motrice*, the cable is a "mixed" one, comprising three conductors for power transmission and twelve telephone wires.

Birkenhead.—SUB-STATIONS.—The Electricity Committee is to secure a site for a transformer sub-station on the Manor Park estate, Upton, and a site in Rake Lane By-pass road for a sub-station to replace the existing transformer kiosk.

Bolton.—NO ELECTRICITY FROM DESTRUCTORS.—Having explored the possibilities of producing cheap electricity from steam generated by the destructors the Cleansing Committee has come to the conclusion that it is not practicable to adopt this system of electricity generation for public use at Wellington Yard.

Brighton.—INSPECTION OF LARGE LJUNGSTROM SET.—The large Brush-Ljungström set installed by the Brighton Electricity Department six months ago has been running successfully and has generated over 78 million kWh. It was considered desirable for the unit to be opened up after six months' run for a general inspection, and Mr. W. N. C. Clinch, the borough electrical engineer, states that for long periods this has been the only machine on load at the power station and has carried easily a demand of 40,000 kW. In conformity with usual practice, the unit was opened up after six months' run so that any necessary adjustments could be made and the unit be available for the winter load and, at the same time, for the official consumption tests. This overhaul is now practically completed. The blade system was found to be in a first-class condition. A slight adjustment to the labyrinths was deemed worth while. He expresses his satisfaction with the condition of the set and with its operation in service.

Bristol.—AIRPORT LIGHTING.—The installation of electric boundary lights at the airport at a cost of £1,200 has been recommended by the Airport Committee.

Cheltenham.—OVERHEAD LINES.—Consent has been obtained by the Electricity Committee to the erection of overhead lines for the proposed extensions to Shurdington, Gotherington and the Whaddon Farm estate.

Clayton-le-Moors.—ELECTRIC STREET LIGHTING.—The Council has confirmed an agreement with the Accrington Corporation for the provision of electric street lighting.

Darlington.—LOANS.—Application is being made by the Town Council for sanction to borrow £7,378 for feeder switchgear and reactors and £15,000 for sub-station switchgear and transformers.

Dover.—OVERHEAD LINE.—At a recent meeting of the Electricity Committee it was reported that the Ministry of Transport was prepared to consent to an overhead line being erected in connection with the supply to Guston, but reserved the right to review the situation after five years.

Dumbartonshire.—HYDRO-ELECTRIC SCHEME.—The County Council will shortly consider a proposal for a large hydro-electric station at Loch Sloy. It is stated that the promoters intend to apply next session for Parliamentary authority to proceed with the scheme and to lodge the necessary Parliamentary plans in November. It is proposed to build a dam at the foot of Loch Sloy in order to raise the level of the loch and so form a large reservoir. A power station would be situated near Loch Lomond, and the major works would consist of the dam among the hills at the foot at Loch Sloy, a tunnel through a spur of Ben Vorlich, a pipe-line and the power station. The works, it is stated, would interfere very little with the amenities of the district.

The accompanying photographs illustrate three views of the recent illuminations held for four weeks at Roker Park, Sunderland, and seen by 467,000 people, many of whom came from distant parts of the country. Gate receipts totalled £10,788. An attractive feature was "Alice in Sunderland's Wonderland."

Eston.—REDUCED CHARGES.—The Council is making further reductions in its electricity charges. The lighting rate is lowered by ½d. and the power rate by 1d. per kWh. The new domestic rate "unit" charge is ¾d.

Folkestone.—RETENTION OF EXPERIMENTAL LIGHTING.—The Folkestone Chamber of Commerce and the Hotel and Boarding House Association have urged the Town Council to retain the additional and improved lighting which was erected in connection with the Public Lighting Engineers' conference. The borough engineer is to negotiate with the companies.

Glasgow.—ILLUMINATIONS SCHEME.—The directors of parks and lighting are to report on the advisability of staging a scheme of floral illuminations next year on the same lines as at Morecambe in view of the holding of the Empire Exhibition.

Halifax.—ELECTRIC-DISCHARGE LIGHTING.—At a meeting of the Street Lighting Committee on Monday it was decided to extend the electric-discharge lighting system to Gibbet Street, using fifteen 400-W units.

FURTHER TARIFF REVISIONS.—Following upon a reduction in power charges last April it is now proposed to make concessions to domestic and shop users. Under the lighting maximum demand system all consumption in excess of 300 kWh per quarter per kW of m.d. will be charged at 0.3d. per kWh. Similarly, under the domestic rates for private residences, combined houses and shops, and prepayment a.c. supplies, the rate will be 0.3d. per kWh in excess of 300 kWh per quarter. The effect is that if the recommendations are approved by the Council there will be a 0.3d. running charge component to all two-part tariffs throughout the borough and for all purposes.

Hawarden.—RURAL SUPPLIES.—A canvass has been made of the areas of Bannel, Bretton and Drury. The cost of extending the supply to these districts is estimated at £600 and the revenue at £50. Mr. A. Richardson, electrical engineer to the Rural District Council, considers that the extensions might be carried out providing satisfactory guarantees are obtained.

Hayes.—ELECTRICITY FOR COUNCIL HOUSES.—All the tenants of houses owned by the Urban District Council on the north side of Kingsway have signed a petition asking for the in-

stallation of electricity for lighting purposes. Quotations are to be obtained from electrical contractors for the wiring of the houses.

Higham Ferrers.—OVERHEAD LINES.—The Town Council objects to the Rushden and District Electricity Supply Co.'s proposal to erect overhead lines in King's Avenue and an alternative scheme is being arranged.

Hitchin.—CHARGES REDUCED.—The Urban District Council has approved the following reductions in the price of electricity: Flat rate for lighting, from 6d. to 5½d. per kWh; domestic all-purpose tariff, an average reduction of 8.5 per cent.; and fixed charge for Council houses, parlour type, 1s. per week; non-parlour, 11d.; flats, 10d., instead of the present uniform charge of 1s.

Holland.—TRANSMISSION SYSTEM.—An order is reported to have been placed with the A.E.G. for the establishment of a power transmission system, with 90 km. of oil-insulated cable, between Rotterdam and The Hague, the operating voltage to be 150,000.

Hull.—LOANS.—The Electricity Committee has obtained sanction to borrow £25,000 for wiring installations and £6,091 for the proposed Dunswell intake works.

Ilford.—SUB-STATION.—Sanction is being sought by the Electricity Committee to borrow £5,000 for sub-station equipment.

Keighley.—LOANS.—The Electricity Committee is seeking sanction to borrow £40,000 for mains and services, £15,000 for meters, £10,000 for sub-station equipment and £1,336 for the purchase of apparatus for use in testing stations.

Kingussie and Newtonmore.—BULK SUPPLY.—The electricity supply for Kingussie and Newtonmore is shortly to be changed over from the present local generating plant to a bulk supply *via* the Tummel Bridge-Keith main transmission lines.

Kingston-upon-Thames.—NEW SWITCH-HOUSE.—The Town Council is applying for permission to borrow £69,400 for a new switch-house, control-room and gear.

Lanarkshire.—RURAL SUPPLIES.—The County Council has agreed to accept the proposals of the Clyde Valley Electrical Power Co. for a supply of electricity to a number of districts in the county.

Leeds.—NEW EQUIPMENT.—The expenditure of £115,000 for No. 2 switch-house and transformer bays and equipment at Kirkstall power station, £75,000 for sub-station equipment and £250,000 for mains has been authorised by the Electricity Committee.

Lincolnshire.—LOWER LIGHTING RATE.—The Boston and District Electric Supply Co., Ltd., has announced a reduction in its lighting flat rate to 7d. per kWh. Prepayment meter users will be given rebates. Under the company's "all-in" tariff electricity is obtainable at ¾d. per kWh, plus fixed charge.

London.—FLOODLIGHTED PLAYGROUND.—Floodlighting was inaugurated last week at a school playground at Eel Brook Common, Fulham.

Manchukuo.—SCOPE FOR DEVELOPMENT.—Despite the rapid development of electrical enterprises in Manchukuo in recent years, practically all the peasants, who comprise the greater part of the population, are without electric light. According to an investigation made by the Manchuria Electric Corporation, 338,265 households in Manchukuo (including the Kwantung Leased Territory), representing only 5.9 per cent. of the total number of households (5,753,841), had electric lighting at the end of 1935. The total number of lamps was 2,334,050, or 6.7 lamps per cent. of the population (36,648,630). The latest available figures of power output relate to 1935, in which year the total was 1,084 million kWh, as compared with 500 million kWh in 1930. At present 98 per cent. of the stations are steam operated and use coal as fuel. The Government authorities are, however, proposing to utilise the water-power resources of the country for electric power generation.

Newcastle-on-Tyne.—SUB-STATION.—Plans have been approved for the erection of a sub-station in Percy Place by the North-Eastern Electric Supply Co., Ltd.

ACQUISITION OF ELECTRICITY UNDERTAKINGS.—At a meeting of the City Council it was reported that an expert's report had been received on the Council's scheme for taking over the electricity undertakings in the city area. The matter is being considered by the Parliamentary Committee, which will report shortly to the full Council.

Newcastle-under-Lyme.—CHEAPER ELECTRICITY.—Following consideration of the report of the borough electrical engineer (Mr. A. J. C. De Renzi) for the past year, revealing a record increase in output, the Town Council at its recent meeting approved substantial reductions in electricity charges. The main concessions are as follows:—Lighting flat rate to be reduced from 3¾d. to 3¼d. per kWh; alternative tariff for lighting to be reduced from £6 per kW per annum installed, plus 1½d. per kWh, to £6 per kW per annum installed, plus 1d. per kWh; assisted wiring scheme rate to be 6d. instead of 6½d. per kWh; ordinary heating, cooking, and domestic tariff to be altered so that consumers who use 240 kWh per quarter will pay ¾d. per kWh for all electricity consumed providing they use a cooker and washboiler or a cooker and water heater; substantial reduction in the fixed charge in the case of houses of all sizes where supply is taken on the multi-part tariff, and provision for the smallest house to take supply on this tariff (for a house with a floor area of 2,000 square ft. the fixed charge will be 15s. per quarter); and a reduction of ¼d. per kWh to all large power consumers taking d.c. supply. The reductions take effect as from the September quarter meter readings.

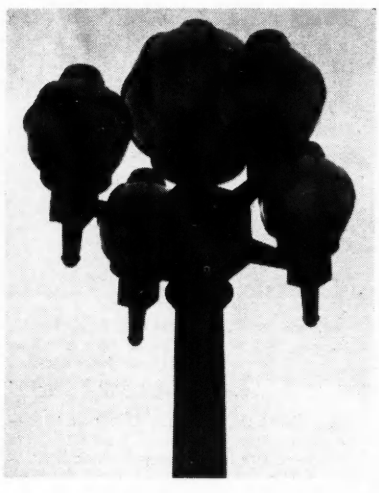
GOVERNMENT'S DISTRIBUTION PROPOSALS.—In his report Mr. De Renzi reviews the position in regard to the Government's proposals for reorganising distribution, and the Mayor (Alderman S. Myatt), moving the adoption of the report, said that Newcastle's undertaking compared favourably with many of the larger city undertakings, and, in fact, it had been found that the smaller undertakings generally compared very favourably with the larger, except that the latter could get lower prices for bulk supplies, a thing they regarded as unfair. Mr. J. H. Ramsbotham, congratulating the chairman and the electrical engineer and his staff on the successful year's working, said the report was in itself the finest possible answer to the proposals of the Committee presided over by the "archdruid of centralisation," Lord McGowan. It should be made clear that the whole of the members of the Council were behind the Mayor and his Committee.

Oldbury.—SUB-STATION.—The S.W. and S. Electric Power Co. is to erect a sub-station in Orchard Street.

Penmaenmawr.—ELECTRICITY CHARGES REDUCED.—The charges for electric lighting in the district are to be reduced by 1d. to 6d. per kWh.

Peterborough.—STREET LIGHTING.—Work has now been commenced on the £8,000 scheme for improving the lighting of the main streets of Peterborough. Sodium lighting is to be installed in eleven streets.

Poland.—NEW POWER STATION.—A *Reuter* message from Warsaw states that in order to guarantee an ample supply of electricity for Warsaw and the immediate neighbourhood it is proposed to build a dam on the Vistula at a point below the capital. A large power station will be erected and will supply 125 million kWh a year. The estimated cost of this work, which will be carried out over a period of four years, is approximately £1,200,000.



An attractive type of lamp erected in front of the Singapore Municipal Offices

Pontypridd.—TRADING ESTATE LIGHTING.—A deputation of the Council, including Mr. G. J. Evans (electrical engineer) recently visited Swansea to inspect the sodium lighting in Mumbles Road prior to deciding the method of lighting to be adopted for the Treforest Trading Estate.

Scarborough.—EXTENSION.—Plans have been passed for an extension of the electricity supply to Brompton-by-Sawdon at a cost of £1,337.

OVERHEAD LINES.—The Ministry of Transport has consented to the Town Council's plan to erect overhead lines between Scalby and Hackness.

Sherston (Wiltshire).—DEMAND FOR STREET LIGHTING.—A public meeting recently decided by a large majority in favour of the Parish Council applying to the Malmesbury R.D.C. for the adoption of powers enabling street lighting to be provided by the Wessex Electricity Co.

Spenborough.—LOWER CHARGES.—As from the final meter reading for the September quarter the Electricity Department is reducing its charges, the concessions being equivalent to over £1,000 to lighting and a similar amount to power consumers. The new lighting flat rate is 4d. per kWh. The residential rate is unaltered, with a running charge of ¼d. per kWh, but there is a new flat rate for domestic cooking only of ¾d. net. For small power the revised terms are 132 kWh per rated kVA of m.d. per quarter at 2½d. per kWh, all consumption in excess of this quantity being charged at 0.6d. per kWh. Other concessions apply to the medium and large power and heating, cooking, ventilation and refrigeration rates. In most cases there is a discount of 2½ per cent. for prompt payment (large power 5 per cent.).

Spennymoor.—ELECTRIC STREET LIGHTING SCHEME.—An inquiry was recently held into the Council's application for permission to borrow £3,480 in connection with its decision to replace the gas by electric street lighting. The application was opposed by the Spennymoor and Tudhoe Gas Co., the Tudhoe and Sunderland Bridge Gas Co., the Weardale Steel, Coal, Coke and Iron Co., and a number of ratepayers. The clerk to the Council stated that from time to time complaints had been received concerning the street lighting, and the finance officer said the Council was convinced that electricity would be cheaper than gas.

Stone (Staffordshire).—STREET LIGHTING.—The Urban District Council has sanctioned an extension of the mercury vapour street lighting, at an estimated cost of £325.

Sutton Coldfield.—BETTER LIGHTING.—The Highways Committee is to improve the lighting in Sutton Oak Road and Mere Green at a cost of £487.

Sweden.—INCREASE IN OUTPUT.—A recent official survey of the production and consumption of electric power in Sweden during 1936, quoted by *Reuter's Trade Service*, states that the total power produced was 7,413 million kWh, representing an increase of 7.5 per cent. on the 1935 production. Of the output for 1936, 649 million kWh was produced by thermal stations, all the rest coming from hydro-electric plant. The hydro-electric stations were in all rated at 1,903,000 h.p. in 1936, compared with 1,736,800 h.p. in 1935.

Torquay.—USE OF TRANSMISSION LINES.—Terms have been arranged for the Whitehall Securities Corporation, Ltd., to use the Corporation's main transmission lines to afford supplies to the company's undertakings at Paignton and Teignmouth.

Wakefield.—MAINS AND SERVICES.—Sanction is being sought by the Electricity Committee to a loan of £25,000 for mains and services.

Walsall.—BETTER LIGHTING.—The Corporation is to remodel the lighting in Calmore Road at a cost of £706.

TESTING STATION.—A scheme has been prepared for the conversion of premises in Butts Road into a testing station and repair shop at a cost of £1,250.

Wellesbourne (Warwickshire).—CONVERSION OF STREET LIGHTING.—The tender of the Midland Electric Light and Power Co., Ltd., for street lighting, was accepted at a recent meeting of the Wellesbourne Mountford and Wellesbourne Hastings Councils. For many years the streets have been lighted by the Wellesbourne Gas Co.

Wigton.—RURAL SUPPLIES.—The Mid-Cumberland Electricity Co. has stated that supplies are to be made available at Rosley, Caldbeck, and Hesket. The Council is inquiring when Boltongate, Ireby, Uldale, and Wiggonby will be supplied.

Wood Green.—SUB-STATION.—The North Metropolitan Electric Power Supply Co. is to erect a sub-station in Albert Road.

Workington.—BATTERY CHARGING TARIFF.—The Electricity Committee has fixed the following tariff for vehicle battery charging: 1½d. per kWh between 7.30 a.m. and 10 p.m., and ¾d. per kWh from 10 p.m. to 7.30 a.m., plus 7s. 6d. per quarter rental for additional meter and time switch.

Worksop.—SHOPPING WEEK ILLUMINATIONS.—Mr. M. S. Mason, the borough electrical engineer, is preparing a scheme of illuminations in connection with the Shopping Week which starts on December 6th.

Worthing.—LOANS.—Sanction is being sought by the Electricity Committee to borrow £50,000 for mains and services and £25,000 for hired apparatus.

Traction

Bristol.—FUTURE OF TRAMWAY SYSTEM.—On October 1st the Corporation became part owners with the Bristol Tramway Co., Ltd., of the tramway undertaking. Within two years the system will be abandoned and a transport service of a type yet to be decided substituted on a joint ownership basis.

Germany.—ELECTRIC RAILWAYS.—The electrified length of the German State Railways now amounts to 1,418 route miles. During 1936 the energy consumption totalled 660 million kWh, of which 328 million kWh was used by the Berlin suburban lines in carrying 408 million passengers and running 16 million train miles.

Finland.—ELECTRIFICATION PROPOSALS.—The Finnish State Railways have been making thorough studies of the conversion of the main lines from Helsinki to Karis and from Helsinki to Riihimaki. The estimated cost of electrification of both routes is 133 million Finnish marks, but unless traffic increases the return will be only about 1 per cent.

Holland.—RAPID ACCELERATION.—A trial has just taken place on the Dutch railway between Maarn and Arnhem of a new electric train which attained 130 km. per hour from a stationary position in 2 min. 31½ sec. Altogether fifty-three three-coach trains of this type and thirty-seven two-coach trains are to be introduced.

Hull.—FURTHER TROLLEY-BUSES.—The Transport Committee is purchasing an additional twenty trolley-buses.

India.—CALCUTTA RAILWAYS.—During the recent tour of the Chief Commissioner of Railways a long discussion took place with members of the Bengal National Chamber of Commerce, which urged the need for a new central station in Calcutta, with electrified suburban lines leading to it from all directions, including underground or overhead lines to Howrah and Sealdah. The Commissioner said the proposals were an ideal to be aimed at, but regretted that the estimated cost of almost £11,000,000 would prevent the scheme maturing in the immediate future.

Newcastle-on-Tyne.—TROLLEY-BUSES.—The City Council has approved the proposal of the Transport and Electricity Committee to convert three more tram routes to trolley-bus operation at a cost of £86,726.

New Zealand.—NEW STATION AT WELLINGTON.—The new central station at Wellington is almost all-electric. In addition to having electrified tracks for the new electric services on the main line and to Johnsonville, the electrical equipment covers lighting, heating, cooking, clocks, lifts, telephones, power for calculating machines, colour-light signalling, and point operation. There are seventy point motors and 127 electric signalling switches. The illumination of the two big clock faces outside the station is controlled by an electric "eye" which switches on the lighting automatically at dusk. The power for all the equipment is taken from the city mains at 11 kV and transformed in a sub-station on the premises.

South Africa.—NEW ELECTRIC SERVICE.—Electric traction was inaugurated last week on the Natal main line from Glencoe to Volksrust. This completes the conversion of the whole of the main line (326 route miles) from steam to electric traction, constituting the most extensive main-line electrification in the British Empire.

Communications

Great Britain.—RELAY STATISTICS.—At June 30th the total number of subscribers to relay services in this country was 247,429, the number of stations 332, and the proportion of relay listeners to total licences 3 per cent. At June 30th, 1936, there were 347 stations and 236,283 subscribers, the proportion of relay listeners to total licences being 3.07 per cent. These figures are considered satisfactory in view of the fact that relay companies are loath to invest further capital for development until the Government's policy regarding the proposed nationalisation of the relay industry is made known.

TELEPHONE CONCESSION.—As from November 1st the special submarine cable charges included in the fees for trunk calls between Great Britain and Northern Ireland and the Isle of Man will be abolished. The maximum charge for a three-minute call will then be the same as for a call on the mainland (2s. 6d. by day and 1s. after 7 p.m.).

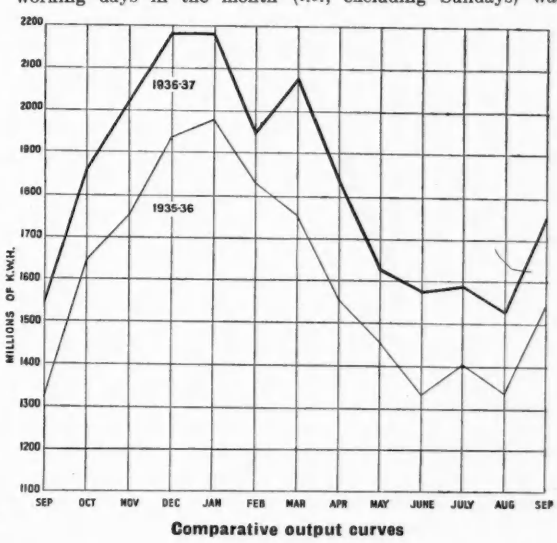
Italy.—TELEVISION.—According to a *Reuter* message a television station is planned for Rome and will start to transmit early in 1938. It will work on a wavelength of seven metres, and will follow a scanning system that is a development of some Marconi patents. The station will be built on the top of Monte Mario, a hill to the north of the capital.

INTERRUPTION OF TELEPHONE SERVICES.—The main telephone lines from Rome to Florence and Ancona were cut last week when a bridge over the Arno, near Viterbo, collapsed, following floods.

Poland.—TELEPHONE PROGRESS.—According to the *Journal des Télécommunications* the number of State telephone system subscribers increased during 1936 from 91,324 to 97,489, and those of the Polska Akcyjna Spolka Telefoniczna from 82,943 to 88,388. On the State system the number of instruments in use advanced from 126,517 to 133,782 and on the company's exchanges from 103,967 to 110,742.

Generation of Electricity in September

THE returns rendered to the Electricity Commissioners show that 1,752 million kWh of electricity was generated by authorised undertakings in Great Britain during September as compared with the revised figure of 1,544 million kWh in the corresponding month of 1936, representing an increase of 208 million kWh, or 13.5 per cent. The number of working days in the month (*i.e.*, excluding Sundays) was twenty-six, the same as last year. During the first nine months of this year the total amount of electricity generated by authorised undertakings was 16,091 million kWh, as compared with the revised figure of 14,170 million kWh for the corresponding period of 1936, representing an increase of 1,921 million kWh, or 13.6 per cent.



Comparative output curves

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Abertillery.—October 21st. U.D.C. Meters. (October 1st.)

Aldershot.—November 2nd. Borough Council. Automatic telephones at the Isolation Hospital, Cemetery Road. (October 8th.)

Australia.—MELBOURNE.—November 9th. State Electricity Commission of Victoria. Twelve three-phase, oil-insulated, self-cooled, indoor type, automatic induction voltage regulators. (T.Y. 19870/37.)*

Bradford.—October 29th. Passenger Transport Committee. Supplies for twelve months, including electrical fittings for vehicles, strand wire and copper controller contacts and electrodes. C. R. Tattam, general manager, 11, Forster Square.

Brighton.—October 25th. Corporation. Two 1,500-kVA outdoor type transformers for the Southwick power station. (See this issue.)

Caerphilly.—October 18th. U.D.C. Electric wiring in houses, under the assisted wiring scheme. W. C. B. Hillman, electrical engineer, Electricity Department, Cardiff Road.

Cardiff.—October 16th. R.D.C. Electric lighting, heating and power installation at the Isolation Hospital, Cowbridge Road, Ely. H. Jackson, electrical engineer and manager, Park House, 20, Park Place (deposit £1 1s.).

Coulsdon and Purley.—October 18th. U.D.C. Electrically illuminated street refuge bollards. Surveyor, Council Offices, Brighton Road, Purley (deposit £1 1s.).

Dalkeith.—October 25th. Town Council. Electrical work at the Buccleuch Street estate. Morham and Brotchie, surveyors, 29, Hanover Street, Edinburgh.

Dumfries.—October 28th. Burgh Council. Two 200-kVA transformers and one 3-panel h.v. metal-clad switchboard. (See this issue.)

Dundee.—November 1st. Electricity Department. 30,000-kW turbo-alternator with condenser and auxiliary plant. (October 1st.)

Fife.—October 19th. County Council. Electrical work at police station, Earlsferry, Elie, and at the Junior Instruction Centre, Cowdenbeath. G. Sandilands, County master of works, County Offices, Wemyssfield, Kirkcaldy (deposit £1 1s. each).

Finchley.—October 25th. Borough Council. E.h.v. and l.v. cables. (October 8th.)

Gellygaer.—November 1st. Electricity Department. House service meters. (See this issue.)

Glasgow.—October 18th. Corporation. Extension to the battery charging switchboard at the refuse power works garage, Govan. Works Office, Corporation Electricity Department, Edington Street, Port Dundas.

Gloucestershire.—Education Committee. Electric lighting installations at Filton Junior Mixed school and Longlevens Junior Mixed school. R. S. Phillips, county architect, Shire Hall, Gloucester (deposit £2 2s. in each case).

Gosport.—October 26th. Borough Council. Electric lighting at 175 houses on the Forton estate. 133 houses on the Ann's Hill estate, and forty-two houses on the Seafield estate. (See this issue.)

Gravesend.—October 20th. Borough Council. Electric traffic control light signals at King Street and High Street. F. T. Grant, borough engineer and surveyor, 6, Woodville Terrace.

Hornsey.—October 30th. Electricity Department. D.c. and a.c. meters and fixed charge collectors, maximum demand indicators, load controllers and time switches. (See this issue.)

Horwich.—October 18th. U.D.C. Overhead lines and electrical equipment along Marklands Reservoir to Marklands House. T. Green, electrical superintendent, Public Hall.

India.—NEW DELHI.—November 9th. Stores Department (Electrical Branch). 25-kW and 10-kW oil engine driven portable generating sets, battery charging equipment, switchboard, spares, &c. (T. 20153/37.)*

Iran.—Ministry of Posts, Telegraphs and Telephones. Short and medium wave radio receiving apparatus. (See this issue.)

Irish Free State.—DUBLIN.—October 18th. Minister for Defence. Electric lighting at Ballymullen Barracks, Tralee, Co. Kerry. Secretary, Department of Defence (Contracts Section), Parkgate (deposit £1 1s.).

November 20th. Electricity Supply Board. 40-kV and 10-kV underground power cables, with pilot and telephone cables and jointing accessories; also cable laying. (See this issue.)

London.—SOUTHWARK.—October 20th. Borough Council. Twelve months' supply of cables. (October 1st.)

STOKE NEWINGTON.—Borough Council. Electric floor-cleaning machines, with combined suction cleaner and floor polisher. (October 8th.)

Maesteg.—October 18th. U.D.C. Electric lighting in sixty houses on the Park housing estate. E. Davies, engineer to the Council, Council Offices.

Manchester.—October 20th. Electricity Committee. Three-phase, four-wire, 400/230-V, a.c. switchgear. (October 1st.) A.c. electric fan motors. (October 8th.)

October 22nd. Waterworks Committee. Four electrically driven multi-stage centrifugal pumps, with automatic control and switchgear, pipes, valves, &c., at Middleton Road, Heaton Park. Chief engineer, Waterworks Offices, Town Hall (deposit £1 1s.).

New Zealand.—WELLINGTON.—January 11th. Public Works Department. 110-kV air-break and oil-immersed outdoor switchgear, one 110-kV circuit-breaker and accessories. (T. 19845/37.)*

January 18th. Public Works Tenders Board. 110-kV outdoor switchgear and steelwork. (T.Y. 19846/37.)*

December 1st. Stores Control Board. Two steam engine- or turbine-driven alternators, switchgear, electric motors and one motor-driven centrifugal pump. (T.Y. 20412/37.)*

Rothesay.—October 25th. Electricity Department. 6,600-V metal-clad switchboard, e.h.v. outdoor switchgear and twelve months' supply of transformers and cables. (October 8th.)

Sheffield.—November 1st. Electricity Committee. Reinforced concrete and other works for the accommodation of a 50,000-kW turbo-alternator and boiler in the No. 2 station at Blackburn Meadows. (See this issue.)

South Africa.—JOHANNESBURG.—October 23rd. City Council. Copper conductor. (T.Y. 19927/37.)*

October 30th. Insulated wire. (T.Y. 19915/37.)*

South Cambridgeshire.—November 2nd. R.D.C. Duplicate electrically driven vertical centrifugal borehole pumps, of 15,000 gal. per hr. capacity, with recording equipment and accessories for the pump-house, near Wendy, in connection with the Western area water scheme. Sands & Walker, Milton Chambers, Nottingham (deposit £3 3s.).

Stoke-on-Trent.—November 10th. Electrical Engineer's Department. Electric tower wagon. (See this issue.)

Taunton.—October 18th. Borough Council. Electrical equipment for the public swimming baths. (October 8th.)

Uruguay.—MONTEVIDEO.—November 12th. State Electricity Supply and Telephones Administration. Electricity meters. (T.Y. 20084/37.)*

Walsall.—October 25th. Electric Supply Committee. Electrical materials and apparatus for twelve months. (October 1st.)

West Hartlepool.—October 23rd. Borough Council. Fire extinguishing equipment at the Tower Street sub-station (automatic operation in addition to manual control). (See this issue.)

Zetland.—November 11th. County Council. Electrical work at forty houses. H. K. Macdonald, county architect, 30, Commercial Street, Lerwick.

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Barrow-in-Furness.—Water Committee. Accepted. Booster plant (£3,558).—Electric Construction Co.

Electricity Committee. Accepted. Switchgear and transformers of the extension of the Buccleuch Street works (£4,390).—Met.-Vick. Elecl. Co. Two 300-kVA transformers (£205 each).—British Electric Transformer Co.

Birkenhead.—Electricity Committee. Accepted. Switchboard (£736).—Ferguson, Pailin.

Birmingham.—Town Council. Accepted. Contracts during the period from July 13th to September 17th: Lighting and power installation at the new Public Baths, Kingstanding.—H. Pratt, Ltd. Electric lighting installation at Sherbourne Road Special school, Balsall Heath.—Stuart Electrical Co. Electrical repairs at various schools and buildings for one year ending June 30th, 1938.—E. Cooper (Electricians), Ltd.; H. Pratt, Ltd.; Parker, Winder and Achurch; W. J. Sheath. Electrically driven motor-type pump at Slaterley Grange Sanatorium.—J. Evans and Sons (Wolverhampton).

Electric Supply Committee. Accepted. Supplies from July 13th to September 17th: Switchgear modifications at Hams Hall power station and Chester Street and Bournville sub-stations; two feeder reactors for Bartley Green sub-station; transformers at Hams Hall station and Solihull and Tyseley sub-stations; and e.h.v. and h.v. switchgear extensions for Solihull and Tyseley feeders at Hams Hall.—G.E.C. Compressed air pipework extensions at Hams Hall.—Stewarts & Lloyds. Meters.—Chamberlain & Hookham; B.I. Cables; Landis & Gyr; British Sangamo Co.; Aron Electricity Meter; Electrical Apparatus Co. Supplemental contract for the supply, fitting to 500-kVA transformers, and delivery of three automatic voltage regulators.—Ferranti, Ltd. Cable jointing compound for twelve months ending June 30th, 1938.—W. H. Keys, Ltd.

Salvage & Stables Committee. Accepted. Six 4-ton electric refuse collection vehicles.—Electricars, Ltd.

Blackpool.—Electricity Committee. Accepted. Transformers for twelve months.—Lindley Thompson Transformer & Service Co. 6,600-V switchgear for twelve months and one 6,600-V switchboard.—Switchgear & Cowans.

Health Committee. Accepted. Electrical installation at Clinic and Library, Bispham.—G. D. Lax.

Estates Commitee. Accepted. Two electric goods lifts.—Evans Lifts, Ltd.

Bradford.—Electricity Committee. Accepted. Oil filter.—Metafiltration Co.

Transport Committee. Accepted. One trolley-vehicle (£1,727).—English Electric Co.

Chesterfield.—Electricity Committee. Accepted. Cables (£2,799).—Ismay Cables, Ltd. Two kiosk sub-stations (£473).—Crompton, Parkinson.

Crewe.—Town Council. Accepted. Kiosk sub-station in Claughton Avenue (£512).—Met.-Vick. Elecl. Co.

Forres.—Managers of Leanchoil Hospital. Accepted. Electrical work in connection with extension scheme.—Mr. Tait.

Glasgow.—Accepted. Electrical installation in the administrative buildings at the Empire Exhibition.—Johnston Park & Co.

Hastings.—Electricity Committee. Accepted. Kiosk extension at Ninfield (£176) and ring main kiosk equipment (£169).—Met.-Vick. Elecl. Co.

Hull.—Transport Committee. Recommended. Twenty trolley-bus chassis, with regenerative control (£998 each).—Crossley Motors, Ltd.

Lanarkshire.—County Council. Accepted. Electric lighting at forty-eight houses at Twechar.—J. Carroll & Sons. Electrical work at Cumbernauld housing estate.—A. Coulon.

Leeds.—Health Committee. Accepted. Electrical work at Crooked Acres Institution.—Santone Electrical Co.

London.—STEPNEY.—Finance and Parliamentary and Electricity Supply Committees (Joint). Equipment for the extension of the Limehouse generating station: One 30,000-kW m.c.r. turbo-alternator and accessories:

	£		£
General Electric Co. (Fraser and Chalmers Engineering Wks.). Recommended	**103,347**	C. A. Parsons and Co.	113,909
British Thomson-Houston Co.	113,105	Metropolitan-Vickers Electrical Co.	116,458
		English Electric Co.	117,785

Three 150,000-lb. boilers and accessories:

	£		£
International Combustion, Ltd. Recommended	**218,580**	Stirling Boiler Co.	225,274
		Babcock and Wilcox	229,116

Thickener and filter plant, complete with motors, starters and conveying plant, for dealing with effluent (£4,085).—International Combustion, Ltd.

Scarborough.—Town Council. Accepted. Switchboards and transformers for a sub-station in the Aberdeen Walk area (£2,385).—Met.-Vick. Elecl. Co.

Torquay.—Highways Committee. Accepted. Lanterns and brackets (£6 7s. 6d. per set).—Revo Electric Co.

Wakefield.—Health Committee. Accepted. Equipment for new baths: Electrode water heaters, switchgear, &c. (£1,295).—A. Reyrolle & Co. Tubular radiant panel and other heaters (£557).—Unity Heating, Ltd. Installation and wiring, &c. (£598), and lighting (£1,344).—H. Smith.

Workington.—Electricity Committee. Accepted. One 100- and one 200-kVA transformers.—Yorkshire Elec. Transformer Co.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, October 21st. Institution, London, W.C.2. 6 p.m. Opening meeting. Presidential address by Sir George Lee. Monday, October 25th. Institution, London. 7 p.m. Informal meeting. Discussion on "Control of Costs in an Operating Organisation." To be opened by the president.

Mersey and North Wales (Liverpool) Centre.—Monday, October 18th. The University, Liverpool. 7 p.m. Address by Mr. G. K. Paton, chairman, entitled "Rural Problem."

North-Western Centre.—Tuesday, October 19th. Engineers' Club, Manchester. 7.30 p.m. Chairman's address by Mr. J. W. Thomas, followed by a reunion.

Sheffield Sub-Centre.—Wednesday, October 20th. Royal Victoria Hotel, Sheffield. 7.30 p.m. Chairman's address by Mr. W. F. C. Cooper, followed by a smoking concert.

South Midland Centre.—Wednesday, October 20th. Grand Hotel, Birmingham. 7 p.m. Address by Mr. H. Hooper, chairman, followed by a conversazione and reunion.

Birmingham Electric Club.—Friday, October 15th. Grand Hotel, Birmingham. 7.30 for 7.45 p.m. Annual ladies' evening.

Institute of Chemistry.—Friday, October 15th. Institute, London, W.C.1. 8 p.m. Streatfeild Memorial Lecture. "Chemical Changes and Chances." Sir Martin Forster.

Institution of Mechanical Engineers.—Friday, October 15th. Connaught Rooms, London, W.C.2. Annual dinner.

North East Coast Institution of Engineers and Shipbuilders.—Friday, October 15th. Literary and Philosophical Society, Newcastle-upon-Tyne. Annual general meeting. Presidential address by Prof. C. J. Hawkes.

Salford Technical & Engineering Association.—Saturday, October 16th. Royal Technical College, Salford. 7 p.m. "The Modern Trolley Bus." Mr. G. Matthews.

Association of Supervising Electrical Engineers.—Tuesday, October 19th. E.L.M.A. Lighting Service Bureau, London, W.C.2. 7.15 p.m. Presidential address by Mr. J. R. Beard. Saturday, October 23rd. Hotel Russell, London, W.C.1. Dinner and dance.

Electrical Power Engineers' Association (*London Technical Group*).—Tuesday, October 19th. Caxton Hall, London, S.W.1. 7.15 p.m. "The Electricity Sales Department." Mr. E. G. Plucknett.

Northern Division.—Saturday, October 23rd. Grosvenor Hotel, Manchester. 6.30 p.m. Supper dance.

Diesel Engine Users' Association.—Thursday, October 21st. Caxton Hall, London, S.W.1. 4.45 for 5 p.m. "The Design of Elastically Supported Foundations for Reciprocating Engines." Dr. R. Klopstock.

Institute of the Plastics Industry.—Thursday, October 21st. Science Museum, London, S.W.7. 7.15 p.m. Annual general meeting. Presidential address by Sir Gilbert Morgan, entitled "The Trend of Research in Plastic Materials."

Institution of Railway Signal Engineers.—Friday, October 22nd. Annual dinner and dance.

Physical Society.—Friday, October 22nd. Imperial College of Science and Technology, S.W.7. 5.15 p.m. Guthrie Lecture. "The Appraisement of Lighting." Dr. C. C. Paterson.

British Institute of Radiology

The British Institute of Radiology, incorporated with the Röntgen Society, is holding its annual congress at the Central Hall, Westminster, London, S.W.1, on Wednesday, December 8th, to Friday, December 10th. Queen Mary has consented to be present at the opening ceremony on December 8th, tickets for which can be obtained on application to the general secretary of the Institute, 32, Welbeck Street, London, W.1. In association with the congress an exhibition of X-ray apparatus will be held at the Central Hall, under the auspices of the British X-Ray Industry.

Notes

E.P.E.A. Industrial Members

At the annual dinner of the Liverpool Industrial Section of the Electrical Power Engineers' Association, held in Liverpool on October 9th under the chairmanship of Mr. R. G. Campbell, the toast of "The Association" was proposed by Mr. J. O. Knowles, who stated that the membership comprised 90 per cent. of those eligible. The technical man, he said, needed a liberal education, which did not necessarily mean a literary education; working with machines could be part of a liberal education. Mr. H. J. Cox (pres. E.P.E.A.), responding, referred to the difficulty of catering for industrial members in the same way as for supply members in the form of a national schedule of salaries. Nevertheless, they joined the Association realising its value in the social and educational sense. The toast of "The City and Port of Liverpool" was proposed by Mr. G. K. Paton (chairman, I.E.E., Mersey and N. Wales Centre), and the Lord Mayor of Liverpool responded. Messrs. W. S. Clement and L. Hoskison also spoke.

Sulphuric Acid Density

The first of the density-composition tables for various solutions of industrial importance, namely, that for aqueous solutions of sulphuric acid, has just been published. The tables are based on the international critical tables and are very comprehensive. They give percentage compositions and concentrations for densities progressing in steps at increasing temperatures. The tables are preceded by explanatory notes, and appendices give details of the British Standard density hydrometers available for use in aqueous solutions of sulphuric acid. Copies of this specification (No. 753—1937) may be obtained from the British Standards Institution, Publications Department, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

The Ideal House

Speaking on "The kind of house a woman should have" at the sixth business hour luncheon of the Electrical Association for Women at the Prince's Restaurant, Piccadilly, London, on Tuesday, Mr. F. R. Yerbury, managing director of the Building Centre, said that the first thing to aim for was a home. Plans should be left to the architect and not interfered with, but it was most important that they should be built round the family and not the family round the plans. Even in the small house an attempt should be made to have at least one completely soundproof room. There was much to be said for the psychological value of the open fire but this in no way interfered with the progress of electricity. The things that were good we should keep. As a rule built-in kitchen equipment was more expensive, but it had great advantages. Proposing a vote of thanks to Mr. Yerbury, Mr. A. C. Cramb, director of the British Electrical Development Association, declared that one of the biggest obstacles to-day to securing the type of house wanted was the "take-it-or-leave-it" attitude of the speculative builder. The chair at the luncheon was taken by Mrs. St. John Ervine.

Educational

The calendar for the 1937-38 session of the Royal Technical College, Glasgow, which is now available, contains detailed information of day and evening classes, and the wide range of subjects includes electrical engineering, metallurgy, mining engineering, civil and mechanical engineering and applied mechanics.

Appointments Vacant

Borough electrical engineer for Ashton-under-Lyne.

Deputy municipal electrical engineer for Singapore.

Meter repairer and mechanic for Coventry Electricity Department.

Boiler house superintendent for Huddersfield Electricity Department.

Civilian wireless instructors for the Air Ministry.

Electrician instructor for the War Department Trade School.

Assistant mains engineer for Aldershot Electricity Department.

Assistant lady cookery demonstrator for Plymouth Electricity Department.

Clerk for the Borough Treasurer's Department, and meter mechanic for the Electricity Department, Bethnal Green.

Assistant consumers' engineer for Swinton and Pendlebury Electricity Department.

Junior showroom assistants (male) for Battersea Borough Council.

Temporary mains assistants in the drawing office, Works Directorate, Air Ministry.

Technical assistant for the Stretford and District Electricity Board.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

SCHAFFLER exploder.

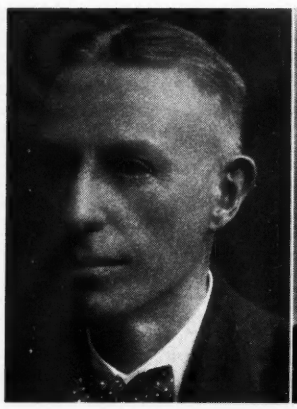
FLEXISCOPE revolving flicker device.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. J. W. Beauchamp, M.I.E.E., commercial manager of the Central Electricity Board, has intimated his desire to retire at the end of this month, he having just passed the age of 65. It will be remembered that Mr. Beauchamp left the South Wales Power Co. seven years ago to become district manager for S.W. England and S. Wales, since when his interest has been devoted to work connected with the grid; for between two and three years he has occupied the post from which he now retires, thus rounding off in the public electricity service a career which has been always enterprising and full of initiative, and at some periods particularly strenuous. He vacates his office in a week or two with a mind as interested as ever in electrical development, and will look on at the efforts of others from a position of greater freedom and less responsibility. He has made a host of friends who will join with us in wishing him many happy years of leisure. If we remember aright, Mr. Beauchamp first came prominently on the scene as borough electrical engineer of West Ham—we need go no further back than that for we are not writing an obituary notice; from West Ham, always an interesting area electrically, he came before the industry as a whole with the scheme for the Electrical Development Association. We recall vividly the launching of that enterprise and his visits to the ELECTRICAL REVIEW office unfolding the plan which was to seek, but not too soon to find, the support of all sections of the industry interested in any way in electricity supply matters. The difficulties which confronted him as its first director would make a good story of the uphill task that fell to those who had vision before others were ready to turn it into practical policy. His name, therefore, is inseparable from the big organisation that E.D.A. has now become. Such matters as national electrical conventions and a national electrical exhibition were early in his thoughts.



Mr. J. W. Beauchamp

[Elliott & Fry.

Mr. E. R. Wilkinson

[Elliott & Fry.

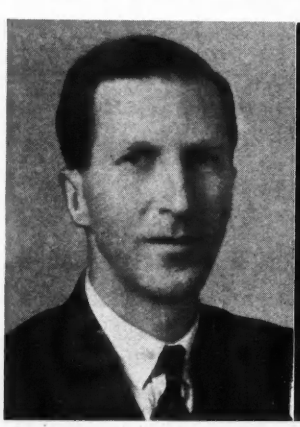
Mr. J. B. Gubbins

Mr. Beauchamp's retirement from Trafalgar House has enabled him to make way for a younger man to succeed him, a man in whom we believe the Board and the supply industry have every confidence, **Mr. E. R. Wilkinson,** M.I.E.E., who has been on the staff of the Board for nearly ten years, first as assistant commercial manager, and for the past three years as deputy commercial manager, both positions preparing him to become commercial manager. Mr. Wilkinson received his technical training at the Dick Kerr works of the English Electric Co., Ltd., and subsequently concentrated on power station design, operation and costs of production. He was with Merz & McLellan for four years before going to the Board.

Mr. J. B. M. Gubbins, A.M.I.E.E., who has been appointed assistant commercial manager, has been on the staff of the Board since 1930, and for the preceding two years he was with Kennedy & Donkin. He is a Faraday House gold medallist.

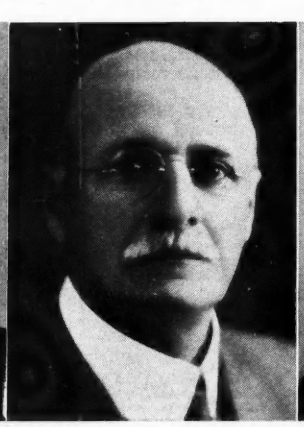
A large and representative assembly of past and present members of the Electrical Engineering Department of the Admiralty and Naval Outports attended a presentation dinner and dance given at the Northumberland Rooms on October 1st on the occasion of the retirement of Mr. A. D. Constable, O.B.E., F.C.G.I., M.I.E.E. (director of electrical engineering), Mr. J. McCaffery, O.B.E., M.I.E.E. (deputy director of electrical engineering), Mr. E. T. Williams, O.B.E., M.I.E.E. (assistant director of electrical engineering), Mr. H. H. R. Green, M.I.E.E. (superintending electrical engineer), and Mr. G. A. Walton (director's confidential clerk). The chair was taken by Mr. J. S. Pringle, O.B.E., M.I.E.E., A.C.G.I., who succeeds Mr. Constable as director. Mr. F. Purser-Fletcher, O.B.E., A.M.I.E.E., A.M.I.C.E., who proposed the toast of "Our Parting Guests," referred to the service careers of the retiring officers and wished them well in their retirement. Mr. Constable was presented with binoculars, a set of carvers, a cigarette case, and a Piezo pick-up. Mr. McCaffery received a silver Sheraton waiter, Mr. Williams a typewriter, Mr. Green a radio set, and Mr. Walton a cabinet gramophone and records. Mr. A. D. Constable responded on behalf of the guests. He referred to the difficulties which had been surmounted in the past and the recent marked progress, and wished the Department well in the future. The Royal Artillery Band played during dinner. Dancing followed and the company was entertained by a programme presented by "The Three Admirals."

Mr. W. Shearer, cashier and works accountant with C. A. Parsons & Co., Ltd., has retired after forty-four years' service with the company. He has been presented with a gold watch and chain and a silver salver with a diamond ring for Mrs. Shearer. The gifts were presented by Mr. F. G. H. Bedford, managing director, who stated that Mr. Shearer was a trusted servant of the late Sir Charles Parsons and was responsible for the introduction of the present costing system. More than 200 people subscribed to the gifts.



Press & Publicity Photographic

Mr. J. A. Stedman



[Poulsen Studios

Mr. W. M. L'Estrange

[Elliott & Fry.

Mr T. E. Daniel

Mr. G. V. Harrap, the author of the article on "Operational Efficiency" which appears on page 526 of this issue, was presented, at the opening meeting of the North Midland Centre on Tuesday evening at Leeds, with the I.E.E. premium, which was awarded for his paper dealing with the finances, taxation and economical operation of electricity undertakings.

Mr. W. M. L'Estrange, M.I.E.E., M.I.E.Aust., whose retirement from the position of chairman and managing director of the City Electric Light Co., Brisbane, was reported in our isue of July 23rd, expects to be in London early in 1938. Mr. L'Estrange is known throughout Australia and to many engineers in England through his long connection with the electrical industry in Queensland. He still retains his position as a director of the company. Mr. L'Estrange also acted as hon. secretary for local affairs of the Institution of Electrical Engineers, London, in Queensland.

Mr. B. G. Drummond, junr., consumers' engineer, Central Sussex Electricity, Ltd., and eldest son of Mr. B. G. Drummond, of Ipswich, was recently married to Miss Margaret S. Hutcheson, only daughter of Mr. D. S. Hutcheson, of Edinburgh.

Merz and McLellan have taken into partnership **Mr. W. Dixon** and **Mr. A. Howell**, who have been members of their staff for a number of years. The headquarters of Messrs. Dixon and Howell will be Carliol House, Newcastle-upon-Tyne.

Mr. T. E. Daniel, A.M.I.E.E., borough electrical engineer at Ashton-under-Lyne, has been appointed to a similar post with the Darlington Corporation in succession to Mr. J. R. P. Lunn, who has resigned. Mr. Daniel has held his present position at Ashton-under-Lyne since June, 1933, and was deputy borough electrical engineer from 1932 to 1933. He was educated privately and at Wallasey Grammar School, and after serving his apprenticeship with a Liverpool firm he took up electrical engineering at Liverpool University. From 1928 to 1932 Mr. Daniel was chief draughtsman and constructional engineer to Battersea Town Council, and he was previously with the North Metropolitan Electric Power Supply Co.

At the annual dinner of the Liverpool Industrial Section of the Electrical Power Engineers' Association, **Mr. W. Woodroofe**, who has been secretary of the section for seven years, was presented by Mr. A. Page, on behalf of the members, with an electric timepiece, and Mrs. Woodroofe with a wristlet watch. Mr. Woodroofe relinquished office a year ago, and has been succeeded by **Mr. G. H. Littler.**

Mr. **C. R. D. Tuckey**, the well-known International lawn tennis player, has joined the sales staff of British Timken, Ltd., and **Mr. E. J. Evans**, of Guest, Keen, Williams, Ltd., Calcutta, will take up residence in Birmingham for three months from November 1st and will be attached to the service department of British Timken, Ltd. **Mr. A. V. Day**, a member of the company's service staff, left England on the *Viceroy of India* on October 9th to inspect Timken-equipped rolling stock in India, Java and Egypt. During his tour in India he will be attached to the staff of Guest, Keen, Williams, Ltd.

Mr. D. Adams, electrical engineer to Preston Corporation, bade farewell to his colleagues on October 7th on the occasion of his retirement. Workers assembled from all departments, including the Ribble power station, the Crown Street works and the head office. Mr. Adams was presented with a granddaughter chiming clock and a gold wristlet watch by Mr. H. Whittaker, mains foreman, who has served under him for over forty years. Mr. J. A. Robertson, who succeeds him, paid a tribute to the service of Mr. Adams. The Town Clerk (Mr. H. Nutter) handed to Mr. Adams a silver salver on behalf of the chief officials of the Corporation.

In our issue of October 1st we announced the appointment of **Mr. J. A. Stedman**, M.A., as E.D.A. Area Officer for the Central England Area in succession to **Lt.-Commdr. A. E. Neal**, who has retired on account of ill health. We now have pleasure in reproducing Mr. Stedman's portrait.

Mr. M. L. Lipman, A.I.E.E., formerly in charge of the marketing of Ekco radio on the Continent, has been appointed heating sales manager of Thermovent (1936), Ltd., which was recently acquired by E. K. Cole, Ltd.

Mr. F. G. Nesbitt has been elected to the board of directors of the Simplex Electric Co., Ltd. He was formerly sales manager of the subsidiary company, Credenda Conduits Co., Ltd., and has for some time held the position of sales manager (cooking and domestic appliances) of the Simplex Electric Co.

Mr. E. Lunn, deputy borough electrical engineer at Huddersfield, has been recommended for the appointment of borough electrical engineer in succession to Mr. J. W. Turner as from January 1st.

The newspaper Press reports that **Mr. Samuel Insull**, of Chicago, together with Mrs. Insull and Mr. Martin Insull, recently arrived in Europe. He is understood to be here "to lead a quiet life as an ordinary Londoner" and not to pursue any business interests. Mrs. Insull is at present in Paris.

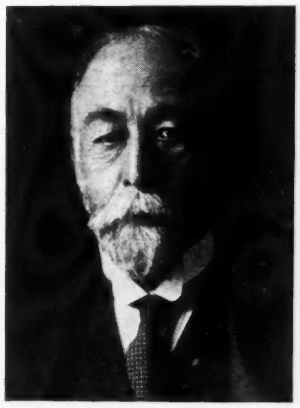
Mr. G. E. Muller, A.M.I.E.E., chief electrical engineer to the Malta Government, has retired after forty-two years' service in Malta. Mr. Muller was chief assistant engineer when the construction of the power house was commenced, and was appointed chief electrical engineer in the following year. On October 3rd his colleagues of the Electricity Branch and the manager and assistant manager of the Water and Electricity Department, gathered together to bid him farewell. On behalf of the department staff Lt.-Col. A. E. McCallef, manager, presented Mr. Muller with two hammered silver effigies of Grandmasters La Vallette and Cottoner of Neapolitan workmanship. Mr. Muller, who sailed for England on the same day, has been succeeded as chief electrical engineer by **Mr. C. F. Buckley**, A.M.I.E.E., M.I.Mech.E., F.R.S.A.

The secretary of the Department of Scientific and Industrial Research announces that the Lord President of the Council has appointed Mr. G. M. B. Dobson, D.Sc., F.R.S., Lt.-Col. J. H. M. Greenly, C.B.E., and Mr. S. K. Thornley, to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research. Professor A. Fowler, C.B.E., F.R.S., Sir Clement D. M. Hindley, K.C.I.E., M.Inst.C.E., and Mr. T. Franklin Sibly, D.Sc., have retired from the Council upon the completion of their terms of office.

Mr. D. C. Brooks has been appointed sales promotion manager of the Westinghouse Electric International Co. According to the *Electrical World*, Mr. Brooks was educated in England, and in 1928 entered the merchandising division of Westinghouse. He was later connected with the London office, where, in addition to his activities in England, his work took him to France, Algeria, Morocco and Tunisia. Mr. Brooks will be head of the sales promotion division, which will carry on the sales promotion and advertising activities of the company.

Obituary

Sir John Dewrance.—We regret to record the death of Sir John Dewrance, for thirty-eight years chairman of Babcock & Wilcox, Ltd., which occurred on October 7th in his eightieth year. Educated at Charterhouse and King's College, London, of which he was a Fellow, he was a pupil of the late Col. Davis, and won the Watt gold medal and a Telford premium of the Institution of Civil Engineers. Following the war he served for six years as president of the Engineering and Allied Employers' National Federation, and in 1923 was elected president of the Institution of Mechanical Engineers. From 1926 to 1928 he was president of the Institute of Metals, and he was also a member of the Iron and Steel Institute and the Institution of Naval Architects. He was for many years on the general board of the National Physical Laboratory and had served as chairman of the British Cast Iron Research Association. He took out more than 100 patents for engineering inventions, and was the head of his own firm of Dewrance & Co., engineers. Sir John was elected chairman of Babcock & Wilcox, Ltd., in 1899, and retired from that position in July last although he retained his seat on the board. He was also the director of a number of other companies. Sir John was created K.B.E. in 1920, and G.B.E. in 1928.



[Elliott & Fry.
The late Sir John Dewrance

Mr. W. H. Coles.—We regret to announce the death on September 24th, of Mr. W. H. Coles, who was very well known in Lancashire, as the manager of the Blackpool branch of the General Electric Co., Ltd. Mr. Coles, who was sixty-one years of age, joined the company in 1909, and in 1912 was appointed to the Liverpool branch, of which he later became assistant manager. When the Blackpool branch of the company was opened in 1929, Mr. Coles was appointed first manager, and he held that position until his death. The funeral was attended by representatives of the company, Corporation officials, and a large number of trade friends.

Mr. F. Dives.—We regret to announce the death of Mr. Frank Dives, assistant engineer of the Charing Cross Electricity Supply Co., Ltd., which occurred on October 2nd, after a long illness. Mr. Dives, who was fifty-eight years of age, had spent practically the whole of his business life of forty years with the company. The funeral took place at Bromley, Kent, on October 6th, when many of Mr. Dives' personal and business friends were present.

Mr. A. E. Kennard.—The death is reported of Mr. Alfred Ernest Kennard, A.M.I.E.E., which occurred at his home at Sydenham on October 7th.

We are asked by **Mr. Arthur Kent** and other relatives of the late Mrs. Kent to thank their friends in the electrical industry for their expressions of sympathy. Mr. Kent is chairman of Kent Brothers Electric Wire Co.

Will.—Mr. W. R. Bullimore, managing director of A. C. Cossor, Ltd., left £473,223, with net personalty £376,722. He made several bequests to members of his staff.

International Engineering Congress

In view of the Empire Exhibition, Glasgow, next year, the Institution of Engineers and Shipbuilders in Scotland is co-operating with the principal engineering institutions in Great Britain in organising an international engineering congress. The Congress is to be held in Glasgow from June 21st to June 24th next, and will include a number of technical sessions, visits to works and social functions. It is hoped to obtain accommodation in the conference hall of the exhibition. A general committee has been established with Lord Weir as president and Mr. A. C. Gardner (president of the I.E.S.S.) as chairman, and executive committees have been formed in London and Glasgow.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Modern Neon Sign Publicity, Ltd.—Private company. Registered October 5th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in brilliant sign letters and neon signs, &c. The directors are: C. C. Clark, 79, St. James' Road, Southsea, and E. D. Watson, 1, Brandon Road, Southsea. Registered office: 79, St. James' Road, Southsea.

Howell Williams (Briton Ferry), Ltd.—Private company. Registered October 6th. Capital, £1,500. Objects: To carry on the business of dealers in radio and television instruments and apparatus, electrical goods and accessories, washing and wringing machines, &c. The permanent directors are: H. Williams, radio dealer, and Mrs. V. Williams, both of 283, Neath Road, Briton Ferry.

W. G. Pye & Co., Ltd.—Private company. Registered October 6th. Capital, £5,000. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in scientific instruments and apparatus, physical and electrical apparatus, instruments of precision for commerce and research, apparatus to be used in connection with television, telegraphy or telephony, &c. The subscribers are: J. E. Adams, 15, Greyhound Lane, Streatham, S.W.16, and R. D. Small, 110, Pavilion Way, Eastcote, Ruislip. Registered office: Granta Works, Newmarket Road, Cambridge.

British McMurdo Silver Co., Ltd.—Private company. Registered October 6th. Capital, £10,000. Objects: To carry on the business of manufacturers of and dealers or specialists in all kinds of radio and television apparatus, cinematographs and parts thereof, &c. The first directors are: R. R. Glen (chairman), H. H. Linton, and W. B. C. Glen. Solicitors: Slaughter & May, 18, Austin Friars, E.C.2.

Freed-Eiseman (British), Ltd.—Private company. Registered October 4th. Capital, £1,000. Objects: To carry on the business of general merchants, electrical, mechanical and general engineers, manufacturers of all kinds of machinery, motors, dynamos, radiators, machine tools, &c. The directors are: M. Bolsom and S. Gootlick, both of 13, City Road, E.C.1. Registered office: 39, Clifton Street, E.C.1.

Middleton & Johnston, Ltd.—Private company. Registered October 7th. Capital, £300. Objects: To carry on the business of tool makers, stampers, brass founders, electrical and motor engineers, &c. The subscribers are: A. J. A. Middleton, 17, Ashbourne Road, Birmingham; and W. Johnston, 71, City Road, Edgbaston, Birmingham. A. J. A. Middleton is the first director. Registered office: 17, Ashbourne Road, Birmingham.

Reform Electric Co., Ltd.—Private company. Registered in Edinburgh October 4th. Capital, £5,000. Objects: To carry on the business of warehousemen and electricians, electrical engineers and factors, &c. The directors are: A. Cheyne, 106, Gray Street, Aberdeen; C. G. Brown, Highclere, Milltimber; R. Simpson, Springfield, Duneacht; and J. W. MacKillop, Garthdee Villa, Garthdee Road, Aberdeen. Registered office: 12, Golden Square, Aberdeen.

Everlite Lamps, Ltd.—Private company. Registered October 8th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in all kinds of electric lamps, radiators, dynamos, &c. The subscribers are: K. W. Brown, 72, Felstead Road, Orpington, Kent, and C. J. Knight, 170, Lower Road, S.E.16. Solicitors: Ashurst, Morris, Crisp & Co., 17, Throgmorton Avenue, E.C.2.

Standing Wireless Service (Leeds), Ltd.—Private company. Registered October 9th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of and dealers in radio, and television instruments, sets and components, dynamos, motors, armatures, &c. The subscribers are: S. W. Stokoe, 8, Norwood Place, Leeds, 6, and E. Hall, 28, Farm Hill Crescent, Leeds, 7. S. W. Stokoe is the first director.

Inventor's Advisory Co., Ltd.—Private company. Registered October 9th. Capital, £1,000. Objects: To acquire or sell, grant licences in respect of letters patent, brevets d'invention, concessions, licences, inventions, rights and privileges, and to carry on the business of manufacturers of and dealers in electrical, gas and oil lamps, reflectors, bowls, fires, stoves, cookers, &c. The directors are: Major C. A. G. S. Sim, 19, Earls Avenue, Folkestone, and K. W. Marstrand, 6, The Bayle, Folkestone. Registered office: 5/11, Theobalds Road, W.C.1.

Gold Seal Battery Co., Ltd.—Private company. Registered October 6th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in electrical batteries and accumulators, &c. The subscribers are: A. S. Miller and F. E. Farres, both of 2, Bond Court, Walbrook, E.C.4. The first directors are Bryan Laing and Arpad Fuchs. Registered office: 39, Victoria Street, S.W.1.

Howell's Radio & Electrical Co., Ltd.—Private company. Registered October 9th. Capital, £500. Objects: To carry on the business of electrical, lighting, heating, radio, mechanical and general engineers, engineering contractors and factors, &c. I. H. P. Watson, of Bryngwyn, Alteryn Avenue, Newport, Mon, is permanent governing director, subject to holding £100 shares. Solicitors: Hornby & Baker Jones, Bank Chambers, Cambrian Road, Newport, Mon.

W.C.B. (Holdings), Ltd.—Public company. Registered October 5th. (Originally registered under the Industrial and Provident Societies Act, 1893.) Nominal capital, £3,000. Objects: To provide land and buildings for factories, workshops and other industrial and commercial purposes or for residential purposes; to manufacture, buy and sell motors, apparatus for power transmission and for heating and lighting, &c. The directors are: C. Boot, Thornbridge Hall, Ashford, near Bakewell, and six others. Secretary: F. W. Page. Registered office: Estate Office, Welwyn Garden City, Herts.

Returns of Electrical Companies

United River Plate Telephone Co., Ltd.—Particulars filed of debentures to secure 30,000,000 Argentine pesos (created outside the United Kingdom) authorised July 22nd, 1937, and covered by trust deed dated August 31st, 1937, charged on the company's property, present and future, except property and assets in the United Kingdom of Great Britain and Northern Ireland, the whole amount being now issued. Trustees: Bank of London and South America, Ltd.

Callender's Cable & Construction Co., Ltd.—Capital, £2,300,000 in £1,500,000 ordinary, £400,000 6½ per cent. cumulative preference and £400,000 7½ per cent. "B" cumulative preference stock. Return dated June 20th, 1937. £1,123,916 ordinary, £400,000 preference, and £400,000 "B" preference stock taken up. £1,255,000 paid, £668,916 considered as paid. Mortgages and charges: £300.000.

National Electric Construction Co., Ltd.—Capital, £185,000 in 10s. shares. Return dated July 29th, 1937. All shares taken up. £175,574 10s. paid on 351,149 shares, £9,425 10s. considered as paid on 18,851 shares. Mortgages and charges nil.

South African Lighting Association, Ltd.—Capital, £100,000 in £10 shares. Return dated June 16th, 1937. 9,000 shares taken up. £88,950 paid, £1,050 considered as paid. Mortgages and charges: £30.000.

Stearn Electric Co., Ltd.—Capital, £4,000 in £1 shares. Return dated August 5th, 1937. All shares taken up. £2 paid, £3,998 considered as paid. Mortgages and charges: £18,200.

Long Eaton Cable Co., Ltd.—Capital, £3,000 in £1 shares. Return dated August 19th, 1937. All shares taken up. £3,000 paid. Mortgages and charges: £5,000.

W. E. Chappell, Ltd.—Capital, £1,000 in £1 shares. Return dated June 21st, 1937. 650 shares taken up. £2 paid, £648 considered as paid. Mortgages and charges nil.

County Electrical Co. (Pendleton), Ltd.—Capital, £2,000 in £1 shares. Return dated July 19th, 1937. 1,000 shares taken up. £1,000 paid. Mortgages and charges nil.

Day & Co. (Electrical), Ltd.—Mortgage debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated September 14th, 1937, to secure £431 or such sum not exceeding £450 as shall have been advanced. Holders: Ethel J. Day, 29, Abercorn Place, N.W., and G. L. Barnett, 72, Oxford Street, W.1.

Bailey & Incledon (1930), Ltd.—Capital, £2,000 in £1 shares. Return dated June 29th, 1937. 1,106 shares taken up. £3 paid, £1,103 considered as paid. Mortgages and charges: £200.

Boothroyd Electrical Co., Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1936 (filed June 18th, 1937). 1,173 shares taken up. £1,173 paid. Mortgages and charges: £1,000. A return of allotments made up to June 17, 1937, shows a further 600 ordinary shares allotted for cash.

Monochrome, Ltd.—Particulars filed of £8,000 debentures authorised September 29th, 1937, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £4,000.

Seal Electric, Ltd.—Mortgage on freehold land and factory premises in High Bullen, Wednesbury, Staffs, dated October 1st, 1937, to secure £1,000. Holders: Wednesbury Tube Co., Ltd., Falcon Road, Bilston.

Ramsgate & District Electric Supply Co., Ltd.—Satisfaction in full (by cancellation or abandonment), on August 7th, 1914, of trust deed dated May 15th, 1914, and registered May 27th, 1914, securing £20,000 debenture stock. (Notice filed September 29th, 1937.)

Hendersons Wholesale Electrical & Radio Co., Ltd.—N. W. Wild, of Orient House, 42-45, New Broad Street, E.C.2, ceased to act as receiver and manager on September 27th, 1937.

Radiant Neon, Ltd.—The nominal capital has been increased by the addition of £700 in £1 ordinary shares beyond the registered capital of £800.

Douglas Keith, Ltd.—The nominal capital has been increased by the addition of £1,400 in £1 shares beyond the registered capital of £100.

Vacuums, Ltd.—Issue on September 16th, 1937, of £100 debentures, part of a series already registered.

City Notes

Petters, Ltd., have entered into a contract with Dawnay Day & Co. whereby the latter undertake to purchase, at 30s. per share, any or all of the 40,000 bonus ordinary shares to be distributed to preference shareholders under the reorganisation scheme. In answer to criticisms Mr. A. P. Good (chairman) states that if the scheme is passed preference holders will then have over 25 per cent. of the present equity of the company. The revised articles will provide that any arrears of cumulative preference dividend shall rank in priority to the ordinary shares in a winding up. It is the directors' belief that the passage of the scheme will give them power to co-operate with other firms in the trade and thereby put the profit-earning capacity of the company on an entirely different basis.

Thomas Bolton & Sons, Ltd.—Particulars were published on October 7th for information only of an issue of 300,000 5 per cent. cumulative preference shares of £1 each. These preference shares were created by the company in general meeting on September 16th. The Telephone & General Trust, Ltd., has agreed to subscribe for the whole of the shares at the price of 20s. 4½d. per share, and British Insulated Cables, Ltd., and Callender's Cable & Construction Co., Ltd., have intimated their intention of purchasing from the Trust 50,000 preference shares at 20s. 6d. per share.

The Ever Ready Trust has announced an interim dividend of 3 per cent., actual, on the ordinary and deferred shares (same).

The Calcutta Electric Supply Corporation.—The Calcutta correspondent of the *Financial Times* reports that the Municipal Corporation, at its meeting on October 5th, decided to purchase from the Supply Corporation such part of the undertaking as lies within the municipal limits of the city. The report states that it is clear from councillors' speeches and from the municipality's own counsel's opinion that the legality and effectiveness of the resolution is extremely doubtful, as it merely supplements a similar resolution in 1936. In any case, the company's large undertakings outside the city boundaries are unaffected.

Ferranti, Ltd., report a net profit for the year ended June 30th, after making provision for general establishment charges, bad debts, taxation, &c., of £64,923, as compared with £57,438 in the preceding year, to which is added £54,472 brought in making £119,395. General reserve receives £10,000 and the dividend on the ordinary stock is maintained at 6 per cent. for the year, leaving £56,395 to be carried forward. The report states that further extensions to buildings and plant have been made during the year. Meeting: October 20th.

The London Passenger Transport Board is paying a final dividend on the £25,698,802 "C" stock of 2¾ per cent., less tax, making a total of 4¼ per cent. for the year (against 4 per cent.). The sum of £28,061 remaining after the payment of the interest, being less than ⅛ per cent. on the London Transport "C" stock outstanding, has, in accordance with the Act of 1933, been transferred to the London Transport "C" stock interest fund.

The River Plate Electricity and Other Securities Corporation has announced interim dividends of 3 per cent. on the ordinary stock, 3 per cent. on the non-cumulative preference and 2¼ per cent. on the 4½ per cent. non-cumulative preferred ordinary stocks.

Edmundson's Electricity Corporation, Ltd., reports that the results of the operations of its group of companies during September, as compared with the corresponding month of 1936, show an increase of 17 per cent. of kWh sold.

Ericsson Telephones, Ltd., is paying an interim dividend of 6 per cent., tax free (same).

Tube Investments, Ltd., has announced a final ordinary dividend of 16¼ per cent., making a total distribution of 23¾ per cent., less tax, for the year (against 17½ per cent.).

Crabtree Electrical Industries, Ltd., has announced a final dividend of 5 per cent., and a cash bonus of 7½ per cent., on the ordinary shares for the initial period ending October 31st, making a total distribution of 17½ per cent.

Ensign Lamps, Ltd., has announced a maiden dividend for the half-year to June 30th at the rate of 20 per cent. per annum.

Venner Time Switches are paying an interim dividend of 10 per cent. on the ordinary stock.

W. B. Dick & Co. (Holdings) are maintaining the interim dividend at 4 per cent.

Max Stone, Ltd., held their annual meeting on October 6th, when Mr. S. Walton (chairman), who presided, said that during the year twelve additional stores had been opened and many existing premises enlarged. With another store opened in August last the company now had fifty-four in active operation in the South of England and in South Wales. Business continued good, and they should derive benefit from the larger spending power which the general public now enjoyed and from increasing demand for the electrical appliances in which the company specialised. Television was being watched with interest, and they were fully prepared and equipped to take advantage of any developments, although from the point of view of wide marketability television only held promise for the future.

Callender's Cable & Construction Co., Ltd., is paying an interim dividend of 5 per cent. (same).

Erinoid, Ltd., has declared a final ordinary dividend of 5 per cent. less tax, making 8 per cent. for the year (against 10 per cent.).

The Oriental Telephone & Electric Co. has declared an interim ordinary dividend of 4 per cent., tax free (same).

The Buenos Aires Town & Dock Tramways reports gross receipts of pesos 2,310,248 for the year ended June 30th, as compared with pesos 2,169,456 in the preceding year. The profit converted into sterling at the average free market rate was £18,156 (against £13,390), which with other revenue makes £26,888. The dividend for the year is 3 per cent. (against 2 per cent.), and £1,543 is carried forward.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets are undergoing a slump for which, in order to find any comparable precedent, it is necessary to go back to the days of the Hatry crash in 1929. The two principal factors df disturbance are, first, a very heavy fall in Americans of all kinds—railroad, utility and industrial—on fears of increased taxation and the impression that President Roosevelt's policy is directed to extreme Socialism. The second contributory cause is the fear aroused by Mussolini's attitude and the apprehension, to which this gives rise, of fresh trouble arising in Europe. People are afraid of their own shadows. There is such absence of buying power as gives forced selling an undue weight. Everyone has been waiting to see whether prices may not go lower. Reason and logic are alike forgotten. The main necessity of the day is to raise money with which to pay losses incurred in speculative transactions. In their anxiety to get out, holders of really good-class stocks and shares force prices down against themselves. A healthier tone lifted prices in some of the markets on this Tuesday afternoon, but, in our own price-lists, the record of falls amongst manufacturing and equipment companies' shares is testimony to the extreme nervousness that has prevailed.

London Transport "C" Stock

The London Transport Board, in raising the year's dividend on the "C" stock to 4¼ per cent., as against 4 per cent. previously, caught the market entirely on the wrong foot. The price of the stock jumped 9 points immediately on the announcement, touching 85: a partial reaction later left the quotation at 82, which, as a matter of interest, compares with high and low points this year of 99¾ and 75¼. The price had previously suffered a lengthy decline, doubts having been freely expressed as to the ability of the Board to maintain the dividend at last year's rate. Apprehension was founded on the presumed rise in expenses which, it was assumed, would have swallowed the modest expansion in gross receipts as shown in the weekly traffics statements. Interest is now fixed on publication of the report. This will appear towards the end of the month. Until then, of course, it will be a matter for guesswork as to how the improvement in gross revenue has been so preserved as to permit an unexpected expansion in the net figures.

Security Value

According to the constitution of the London Passenger Transport Board, if the "C" stock does not receive the standard 5½ per cent. dividend next year, it is open to proprietors to apply for the appointment of a receiver. Such an eventuality seems so impossible as to be almost ludicrous, and yet it is carefully canvassed in some quarters. The traveller in America has often seen parts of a railway, or of a utility service, bearing a label stating that they are hypothecated to the service of certain bond-holders. To the British mind this suggests, of course, liquidation, but in America it is far from being the case. The fact of equipment being specifically allocated to certain bonds simply means that a company has made

The new Whipps Cross open-air bathing pool, Leyton, showing the lighting of the main pool by 1,000-W Holophane floodlight projectors on 12-ft. poles, which were restricted to this height owing to the insistence of the Epping Forest Commissioners that no fittings should be seen from outside the enclosure of the pool. The Holophane scheme also includes changing colour lighting by automatic dimmers for the cascades

an issue of bonds that is secured upon equipment which forms part of a railroad or other service. The bondholder can go and see for himself the assets, or part of them, upon which his investment is secured, the allocation of such security being notified on the equipment in question.

Electricity Supply Shares

The security of shares in Home electricity supply undertakings is again standing shareholders in good stead during a period of disturbed market conditions. Prices have, of course, taken fairly substantial falls since the beginning of the year; nevertheless, the market has been one of the few sections of the Stock Exchange to resist the general fall in prices during the past month or so. Uneasiness over the plans proposed for reorganisation of the industry may be said to have subsided. The feeling is that legislation, when it does come, will adhere more closely to the moderate lines of the McGowan Committee's recommendations than to the drastic measures indicated by the Government. Electric Finance and Securities shares are $\frac{1}{8}$ lower. Northamptons lost ninepence. A few falls of sixpence apiece have occurred in the provincial and Scottish group. In the overseas section, Calcutta Electrics, at 39s., have turned dull on a report that the Municipal Corporation intends to take over the municipal part of the company's areas. It is said, however, to be doubtful whether the Corporation has the necessary powers.

Equipment and Manufacturing

The industrial market as a whole has continued during the past week to yield ground before the pressure of matters which are now only too familiar to the holder of even the soundest shares. The electrical equipment group of shares shows a string of substantial losses. Among the leaders, General Electric lost 3s. 6d. to 77s. 6d., and Associated Electricals 2s. to 44s. Telegraph Constructions relapsed to 2¼ and Siemens to 30s. Crompton Parkinsons, at 48s. 9d., have shed a further 3s. 9d. The leading cable manufacturing issues suffered with the rest, except in the case of British Insulated, which are maintained at 4½. Among the more speculative issues, Brush, at 33, and English Electrics, at 30s., are on the flat side. Lancashire Dynamos have given way to 3⅜, and Reyrolles to 59s. 6d. Other shares which have lost ground include Switchgear and Cowans, now 17s., Laurence Scott & Electromotors 51s. 3d., Walsall Conduits 25s., and Consolidated Signals 5½. Ericssons, at 2½, are half a crown down; the interim dividend, just declared, of 6 per cent., free of tax, is the same as that for last year, when the total distribution was brought up to 25 per cent. At that rate the yield on Ericssons works out at under 3 per cent., so that an increase in this year's final payment is obviously expected.

American Conditions

American affairs, as already mentioned, continue to have an important say in the behaviour of London markets. The immediate effect here of the collapse of Wall Street prices has been, as anyone can see, to bring about realisations of all manner of marketable securities to pay for losses incurred by the speculators in Americans. The slump has also caused much searching of the trade position, both here and in the States, to find out what justification exists for America's pessimism. This point is, by general consent, of first-class consequence, for a continuance of the upswing in American business is regarded as one of the essentials for the hoped-for revival in world trade. Various indices to business conditions in America suggest that, while activity has hung fire, so far as the expected autumn revival is concerned, it is very easy to exaggerate the effect of a slowing-down of industry that may prove to be but temporary. Meanwhile, the prices of American issues are decidedly weak. American Telephone & Telegraph has shed 5 points.

Crabtree Dividend

The declaration of a final dividend of 5 per cent., plus a bonus of 7½ per cent., on Crabtree Electrical Industries ordinary shares, was better than some people had looked for. The shares were marked up 1s. to 31s. 3d. on the announcement, but fell away later to 29s. 6d. Together with the interim dividend of 5 per cent. the latest payments bring the total distribution for the year to 17½ per cent. At this rate the yield on the 10s. shares at their present price, less the equivalent of dividend and bonus, is about 6 per cent. It is less than a year ago that the shares were offered for public subscription at 12s. 9d. each, so the original allottees have done exceedingly well with their investment .

Miscellaneous Matters

Cable & Wireless stocks have weakened in sympathy with general conditions. Anglo-American preferred stock shed 3 points. Great Northerns have fallen 10s. Brazilian Tractions, under heavy sales from Brussels and Amsterdam, went back 2¼ to 18¾. The shares have been one of the storm-spots of the American slump. In the traction group, British Electric deferred at 1050 shows a drop of 100 points. Tillings fell 2s. 6d. to 58s. 9d. Iron and steel shares have been very heavy. Babcocks at 43s. 9d. have fallen 2s. Rubber shares are weak on a sharp decline in the price of the commodity, said to be due, in the main, to forced liquidation from the Continent. This week's recital is, indeed, a melancholy business, but it can be added that there are indications of the slump coming to an end.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Last.	Price Oct. 12.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	67/6	—	4 9 0
City of London	1	7½	7½	34/6	—	4 7 0
Clyde Valley	1	7	8	40/6	—	3 19 0
County of London	1	10½	10½	49/–	—	4 5 9
Edmundson's 7% Pref.	1	7	7	33/6	—	4 3 7
Do. Ord.	1	8	9	39/–	—	4 12 4
Elec. Dis. Yorkshire	1	9	9	41/6	—	4 6 10
Elec. Fin. and Securities	1	12½	12½	2⅝	–⅛	4 15 3
Elec. Supply Corporation	1	11	12	52/6	—	4 11 5
Lancs Light and Power	1	7½	7½	22/6	–6d.	4 12 4
Lond. Assoc. Electric	1	—	7	31/3	—	4 9 6
London Electric	1	7	8	35/6	—	4 10 2
London Power Deb. Red.	Stock	5	5	105½	—	4 14 9
Metropolitan	1	10	10	46/–	—	4 7 0
Midland Counties	1	7½	8	37/6xd.	–6d.	4 5 4
Mid. Elec. Power	1	8	9	2½	—	4 4 8
North Eastern Electric Ordinary	1	6	7	32/–	—	4 7 6
Do. 7% Pref.	1	7	7	34/–	—	4 2 4
Northampton	1	10	10	45/–	–9d.	4 9 2
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	48/9	—	4 2 1
Do. do. 6% Pref.	1	6	6	30/6	—	3 18 8
Scottish Power	1	8	8	36/6	–6d.	4 7 8
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/–	—	6 16 4
Yorkshire Elec.	1	8	8	2	—	4 0 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	112½	—	4 9 0
Do. 1955–75	„	5	5	115	—	4 7 0
Do. 1951–73	„	4½	4½	109	—	4 2 7
Do. 1963–93	„	—	3½	97½	—	3 17 10
London Elec. Trans. Gtd.	„	—	2½	90	+2	2 15 6
London & Home Counties, 1955–75	„	4½	4½	111	—	4 1 1
London Passenger Transport, A	„	—	4½	113½	—	3 19 4
Do. do. B	„	—	5	117½	—	4 5 1
Do. do. C	„	4	4½	82	+6	5 3 8
West Midlands Joint Elec. 1948–68	„	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	159½	+5	5 12 10
Anglo-Am. Tel. Pref.	Stock	6	6	115½	–3½	5 4 0
Do. Def.	„	1½	1½	29½	—	5 1 8
Cable & Wireless 5½% Pref.	„	4½	5½	99½	–1	5 10 5
Do. Ord.	„	—	—	68½	–3	—
Do. Income	„	—	—	101½	–1	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	16	–½	3 8 8
Do. do. Pref.	10	6	6	14½	—	4 5 9
Great Northern Tel.	10	20	20	40	–½	5 0 0
Marconi-Marine	1	10	7½	32/6	–⅛	4 12 4
Oriental Telephone Ord.	1	12*	12*	3	—	4 0 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	5/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	18½	—	—
British Electric Traction Def. Ord.	„	5	5	1050	–100	—
Do. do. Pref. Ord.	„	8	8	168	—	4 15 5
Brazil Traction	$100	40cts.	50cts.	18¾	–2¼	—
Brit. Columbia Elec. Rly. Pfce.	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds	$500	5	5	33	–2	—
Victoria Falls Ord.	1	20	12	61/3	—	3 18 5
West Riding	1	6½	10	42/6	—	4 14 1
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	2⅜	—	6 6 4
Assoc. Elec. Ord.	1	8	10	44/–	–2/–	4 11 0
Do. Pref.	1	8	8	37/6	—	4 5 3
Babcock & Wilcox	1	8	10	43/9	–2/–	4 11 5
British Aluminium Ord.	1	7½	10	44/6	–1/9	4 9 10
British Insulated Ord.	Stock	20	20	4½	—	4 5 6
Brush Ord.	Stock	Nil	Nil	33½	–6	—
Callender's	1	15	15	4½	–½	3 6 8
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	2 7/8	–⅛	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	1⅞	–⅛	5 6 8
Enfield Cable Ord.	1	25	25	5½	–⅜	4 17 6
English Electric	1	Nil	Nil	30/–	–3/6	—
Do. do. Pref.	1	6½	6½	26/6	—	4 18 1
Ericsson Tel.	5/–	20	25	2½	–½	2 18 7
Ever Ready	5/–	35	45	29/3	–9d.	7 13 7
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	77/6	–3/6	4 10 2
Henley's	5/–	30	15	18/9	—	4 0 0
Do. 4½% Pref.	1	4½	4½	1⅛	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	7½	10	42/6	–⅜	4 14 1
Lancashire Dynamo	1	10	20	3⅜	–⅜	5 18 6
Siemens Ord.	1	6	7½	30/–	–3/3	5 0 0
Telegraph Construction	£1	Nil	7½	2½	–⅛	3 6 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1935

34355. "Manufacture of electric cables or other insulated conductors." Soc. Alsacienne de Constructions Mecaniques. December 12th, 1934. (Cognate application 34356/35.) (471935.)
34710. "Direction-finding apparatus." F. J. Hooven. December 14th, 1935. (472111.)
35005. "Television transmitter." Radioakt.-Ges. D. S. Loewe. December 21st, 1934. (Addition to 465184.) (472160.)

1936

528. "Combined electric lamps and generators." G. W. Rawlings. February 5th, 1937. (472039.)
1348. "Electron-discharge devices." H. G. Lubszynski. January 15th, 1936. (472162.)
1413. "Electric irons." W. M. Betts. January 16th, 1936. (Cognate application 8998/36.) (472112.)
6557. "Shade carrier galleries for electric or gas light fittings." E. Barnard. February 18th, 1937. (471898.)
7297. "Focusing systems for electron beams." Ferranti, Ltd., and M. K. Taylor. March 11th, 1936. (472165.)
7330. "Electric metallic-vapour arc discharge lamps." J.-B. J. M. Abadie. August 13th, 1935. (471900.)
7340. "Manufacture and construction of radio receivers." G. W. Johnson (Philco Radio & Television Corporation). March 11th, 1936. (472046.)
7355. "Determination of electrical values." P. Wulff and W. Kordatzki. March 11th, 1936. (472116.)
7402. "Flat-iron with time-switch." H. A. E. Stumpe. March 12th, 1935. (471906.)
7515. "Electrolysis of sodium sulphate." I.G. Farbenindustrie Akt.-Ges. June 27th, 1935. (471912.)
7522. "Cathode-ray tube apparatus." Telefunken Ges. für Drahtlose Telegraphie. March 12th, 1935. (471913.)
7539. "Electric lampholders." Ward & Goldstone, Ltd., and S. Goldstone. March 13th, 1936. (472049.)
7664. "Electric-motor operated braking equipments." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitats-Ges.) March 13th, 1936. (471976.)
7765. "Measurement of electrical quantities." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. March 15th, 1935. (472168.)
7766. "Electric signalling systems." H. Hitchen and T. Quick. March 14th, 1936. (471978.)
7873. "Alternating-current electric welding plant." British Thomson-Houston Co., Ltd. March 16th, 1935. (471980.)
7903. "Modulated carrier-wave receivers." Marconi's Wireless Telegraph Co., Ltd. March 14th, 1935. (Addition to 431755.) (Cognate applications 7904/36 and 7905/36.) (472128.)
8268. "Variably coupled tuned circuits for use, for example, in superheterodyne wireless receivers." Hazeltine Corporation. April 22nd, 1935. (471982.)
8377. "Telephone systems." Siemens Bros. & Co., Ltd., H. E. Humphries and B. A. Hensler. March 20th, 1936. (472052.)
8398. "Cathode-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 14th, 1935. (472240.)
8810. "Microphones." H. J. Von Braunmuhl and W. Weber. September 7th, 1935. (472056.)
10536. "Counting of electrical impulses." Siemens Bros. & Co., Ltd., and H. E. Humphries. April 9th, 1936. (471987.)
10538. "Electric-discharge tubes." Siemens Electric Lamps & Supplies, Ltd., J. N. Aldington and P. D. Oakley. April 9th, 1936. (472183.)
11947. "Means for fixing together a pair of electrical contacts." British Insulated Cables, Ltd., R. W. Blades and J. Rawlinson. April 27th, 1936. (472185.)
12498. "Means for repairing the screens of electric cables." Pirelli-General Cable Works, Ltd., and P. Pillon. May 2nd, 1936. (472063.)
12504. "Photo-cathodes for photo-cells." British Thomson-Houston Co., Ltd. May 3rd, 1935. (472064.)
12617. "Continuous current dynamo-electric machines." G. M. Pestarini. May 4th, 1936. (471948.)
14791. "Insulating supports for conductors of electric current." Soc. Anon. le Bois Bakelisé. May 25th, 1935. (471950.)
15208. "Illuminated signs." Electrolumination, Ltd., and L. C. Casselle. May 29th, 1936. (471997.)
15246. "Electrolytic condensers." British Insulated Cables, Ltd., and J. C. Quayle. May 29th, 1936. (472069.)
16660. "Method and arrangement for reproduction of pictures, especially for television purposes." E. Michaelis. June 15th, 1935. (472073.)
17492. "Radiographic apparatus." F. T. Powers. June 24th, 1936. (472078.)
18183. "Alternating-current electric winder equipments." R. W. Worrall and Metropolitan-Vickers Electrical Co., Ltd. June 30th, 1936. (472192.)
20415. "Extensible electric cords." H. A. Ungemuth. July 26th, 1935. (472082.)
20745. "Electric-discharge devices having auxiliary electrodes." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). July 27th, 1936. (472194.)
20783. "Fireproof electric conductors." British Thomson-Houston Co., Ltd. July 27th, 1935. (472083.)
25508. "Method of and means for electric heat treatment of toothed gears and other articles." F. S. Denneen and W. C. Gunn. September 19th, 1936. (472198.)
25780. "Galvanic cell." Pertrix Chemische Fabrik Akt.-Ges. October 28th, 1935. (472094.)
26258. "Means for the automatic control of strip tension in electrical apparatus operating on strip material." British Thomson-Houston Co., Ltd. September 27th, 1935. (472200.)
28057. "Television system for the simultaneous transmission of all pictured elements." F. Von Okolicsanyi. December 12th, 1935. (472009.)
28183. "Electrical condensers." C. Lorenz Akt.-Ges. October 18th, 1935. (472095.)
28887. "Electrolytic condensers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 26th, 1935. (472097.)
32066. "Electric switches having arc-extinguishing arrangements." F. Strauss (née Ruppel). November 21st, 1935. (472139.)
34855. "Electric resistances." Standard Telephones and Cables, Ltd. January 17th, 1936. (472144.)
35297. "Microphonic materials." Standard Telephones and Cables, Ltd. February 7th, 1936. (472101.)
35374. "Electric welding apparatus." British Thomson-Houston Co., Ltd. December 28th, 1935. (472213.)

1937

424. "Modulated carrier-wave systems." Marconi's Wireless Telegraph Co., Ltd. September 17th, 1936. (472214.)
1829. "Electric switchgear." British Thomson-Houston Co., Ltd. January 24th, 1936. (472218.)
2404 "Piezo-electric crystals. Siemens and Halske Akt.-Ges. January 27th, 1936. (472148.)
3481. "Apparatus for generating or receiving high-frequency currents." C. Lorenz Akt.-Ges. February 5th, 1936. (472106.)
9048. "Navigating-aiding radio systems." Soc. Francaise Radio-Electrique. March 30th, 1936. (472155.)
12265. "Electric arc-welding apparatus." British Thomson-Houston Co., Ltd. April 29th, 1936. (472036.)
17852. "Manufacture of electric cables or other insulated conductors." Soc. Alsacienne de Constructions Mecaniques. December 12th, 1934. (Divided out of 471935.) (Cognate application 17853/37.) (472159.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 6th:—

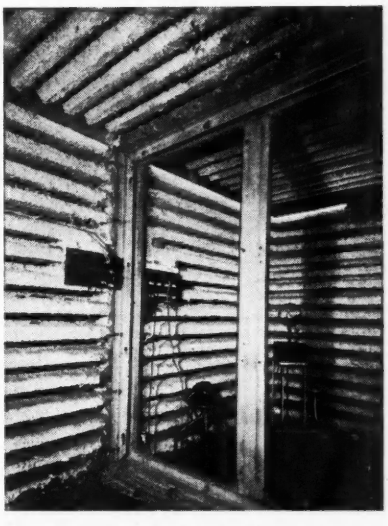
Calmet. No. 577157. Class 6. Machinery of all kinds and parts thereof.—The Calorizing Corporation Great Britain, Ltd., 22, Farringdon Street, E.C.4.

Tarkak. No. 573831. Class 8. Wireless telegraphic and telephonic apparatus and parts thereof.—Harry Cohn, 85, New Cavendish Street, W.1.

Noise Measurement

THE Cie Parisienne de Distribution de l'Electricité has installed a soundproof room for the purpose of studying noise produced by or due to structural defects.

This room consists of a 30-ton concrete chamber suspended on springs inside a second concrete chamber in the basement of the company's building. The walls of the internal chamber are from 15 to 22 cm. thick and are covered with a layer of asbestos fibre on their outer faces. All interior surfaces except the floor which has been left smooth, have been provided with a series of ribs to help prevent reflection of internal sounds. A 10 cm. air space is left between the walls of the two chambers.



The interior of the soundproof room

The soundproof doors are constructed of two heavy wood planks with the space between them filled with sound absorbing material. The edges are rendered soundproof by a double row of rubber which is kept from deterioration by the provision of a double-pivot hinge arranged so that the final part of the door-closing movement is a direct push rather than a pivot.

Under the floor is a series of baffles internally covered with a layer of asbestos fibre, one end of which admits the air while the other opens into the room. Above the ceiling a similar set of baffles has been arranged for the outlet of the air and provided at its end with a silent running fan. The entrance of noises by the ventilation system has thus been avoided. The interior of the room is entirely faced with a 4-cm. layer of asbestos fibre applied with an air gun. On the floor a thick wool carpet has been laid over the fibre.

A microphone inside the soundproof room is connected to the apparatus to be tested, which is installed in a separate external chamber and controlled from the soundproof room also by means of flexible wires to prevent noise transmission.

The measuring apparatus, consisting of an oscillograph which registers the sounds picked up by the microphone in the room, is placed outside the soundproof room.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abbots Langley.—Factory, Ridgehurst estate; Watford Ideal Homes, Ltd.

Aberdeen.—Houses (90), Don Street, Woodside, for Stewarts Estates, Ltd.

Aberdeenshire.—School, Bankhead (£27,250), for C.C.; architect, County Council, Aberdeen.

Ashton-under-Lyne. — Construction of shopping centre, Queen's Road, Hurst Cross; Drury & Gomersall, architects, Manchester.

Banstead.—Houses (53), Walton-on-the-Hill; U.D.C. surveyor.

Barking.—Varnish factory, Jenkins Lane; Gross, Sherwood and Heald, Ltd., Jenkins Lane.

Barnsley.—Extensions to showrooms, New Street; Barnsley Co-operative Society, Ltd.

Barrow-in-Furness.—Houses, Schneider Road and in new road; J. H. Sharp.

Bethesda.—Houses (33), three sites; Isgoed Williams, architect, Brynderwen Offices, Penmaenmawr.

Bingley (YORKSHIRE).—Houses (31), Cullingworth; U.D.C. surveyor.

Birkenhead.—Premises, Hamilton Street, for Martins Bank, Ltd., 7, Water Street, Liverpool; E. C. Aldridge, architect, 14, Castle Street. Tenements (32), Ilchester Road (£20,105); Lloyd & Cross, Ltd.

Birmingham.—Houses (100), Hodge Hill, for Hodge Hill estates, 858, Washwood Heath Road, Birmingham. Cinema, Bristol Road South, Northfield; M. Dent, Westbourne Road, Edgbaston. School, Turves Green (£49,000), for E.C.

Blackpool.—Cinema, Marton, for the South Shore Theatres, Ltd.; Halstead Best, architect.

Bolton.—Two schools, Piles Lane and Pilkinton Street, for E.C.

Bradford.—Houses and flats, Wapping area, and premises for Grange High School for Boys; city architect. Aircraft centre, Leeds Old Road; West Riding Army Association.

Braintree.—Houses (56), Panfield Lane; U.D.C. surveyor.

Bristol.—School, Novers Hill (£14,300); U.D.C. surveyor.

Burnley.—Houses (258); borough surveyor.

Canterbury.—Houses (128), Reed Avenue, for C.C.; H. M. Enderby, city surveyor.

Carlisle.—Houses, Currock estate, and Millholme Terrace estate; city engineer, 18, Fisher Street.

Chelmsford.—Houses (28), Woodham Ferrers and Writtle; R.D.C. surveyor, Council Offices, Waterloo Lane.

Cheltenham.—Houses (29), Prestbury Road, Staverton; E. T. Stinchcombe & Son.

Chertsey.—Houses (32), Chertsey and Addlestone (£15,721); E. Clarke & Sons, Ltd., Addlestone.

Chippenham.—Houses (152); Beard & Son, Bristol.

Coventry.—Airport buildings, Baginton; Norman & Dawbarn, architects, 43, Grosvenor Place, London, S.W.1.

Dagenham.—Houses (139), New Road, Oval Road South; Rylandes Estate, Ltd., Dagenham.

Denholme.—Houses (41), Pit Lane; R. Naylor & Son, contractors, West Park Road, Bradford.

Denton.—Houses (108), Tame Street; J. B. Cook, surveyor, Town Hall.

Dewsbury.—Hall, shops, and offices, Robinson Street, Long Causeway; Firth, Son & Blackburn, architects, Wellington Road.

Earlestown.—Houses (100), Grosvenor estate; H. Horridge, builder and contractor, Wargrave Road, Newton-le-Willows.

Ebbw Vale.—School, Beaufort Fields, Glyncoed; G. H. Davies, architect, Cross Street, Abergavenny.

Eccles.—Offices, hangar, &c., Barton Airport; F. Hill & Sons, Ltd. Alterations to Park Hotel, Monton Road; J. Holt, Ltd.

Essex.—Schools, Broomfield (£26,500), and Yardley Lane, Chingford (£21,578); county architect, Chelmsford. School, Collier Row, Romford, for County E.C.

Gateshead-on-Tyne.—Houses (116), Old Fold; A. V. Clerey and Son, builders, Sunderland. Factory, for Hugh Wood and Co., Ltd.; L. J. Couves and Partners, architects, Carliol House, Newcastle-on-Tyne. Factory, for the Jayess Clothing Co., Ltd., Team Valley estate; J. R. Rutherford and Sons, builders, Minories Joinery works, Newcastle-on-Tyne. R.C. school, Joicey Road; P. J. Stienlet and Son, architect, 5, Saville Chambers, Newcastle-on-Tyne.

Gillingham (KENT).—Extensions to Napier Road school (£31,863), for E.C.; T. Cornelius & Son, contractors, Avondale Road.

Gosforth.—Houses, Elmfield Park; A. Woolf, Ltd., builders, Fernville Road, Gosforth.

Greenock.—Cinema, Ratho Street, for the Scottish Cinema and Variety Theatres, Ltd.; the secretary.

Halifax.—Baths (£62,500); borough surveyor.

Hemsworth.—Houses (90), Kingsley (£42,780); W. Hanley & Sons, builders, Barnsley Road.

Hertfordshire.—School, Manland, Harpenden (£60,000), for County E.C.; education architect, Hertford.

Hull.—Houses (230), Bilton Grange estate (£77,189); Tarran Industries, Ltd. Flats (92), Bilton Grange estate; city architect. School, Priory Road (£17,900); G. H. Panton & Sons, Ltd.

Ilford.—Factory, Chadwell Heath Lane; J. T. Perrin, architect, 279, Hampton Road. Flats (84), Fulwell Avenue; New Ideal Homesteads, Ltd.

Ilkeston.—Factory, Awksworth Road; A. Booth & Sons. Premises, Bath Street; F. W. Woolworth & Co., Ltd. Extensions to bus depot, Park Road; Midland General Omnibus Co., Ltd.

Insch (Aberdeenshire).—Houses (30); A. M. Hay, Inverurie.

Irish Free State.—(DUBLIN).—Houses, Beggars' Bush Recreation Field, Dublin, for the Post Office Public Utility Society, Ltd., 52, Parnell Square, Dublin; McDonnell and Dixon, architects, 20, Ely Place, Dublin. (NEW ROSS, CO. WEXFORD).—Houses (76); J. V. Downes, architect, 58, Fitzwilliam Square, Dublin.

Keighley.—Council offices, College Street (£5,350); borough architect.

Kidderminster.—Houses (28), Cookley and Chaddesley Corbett (£11,900); W. Hunt & Son, Bewdley.

Kingston-on-Thames.—Houses (38), Dickergate Lane (£15,135); Franklin & Co., Ltd., Erith, Kent.

Leatherhead.—Houses (56) (£19,180); G. Wigley & Son, Ltd., River Lane.

Leeds.—Extensions to St. James's Hospital (£39,774); Armitage & Hodgson, Ltd. Rebuilding of Plaza Cinema, Wellington Road; Cinema Co.

Liverpool.—Police training school and headquarters (£89,180); city engineer. Treatment block (£40,000), for the Board of Management of the Royal Liverpool Children's Hospital, Myrtle Street; Barnish, Silcock & Thearle, 58, Rodney Street.

Lochgelly.—Houses (52), Launcherhead, Stationhead and Top of the Town (£32,000); burgh surveyor.

London.—(GREENWICH).—Flats (24), Blackheath Hill site (£17,650); borough surveyor.

Manchester.—Block of flats, Wilmslow Road and Brighton Grove, Rusholme, for the Town and Counties Consolidated Properties, Ltd.; Moston Brick and Building Co., Ltd., contractors, Kenyon Lane, Moston. Schools (£47,000); managers, Manchester Jews' School, Cheetham.

Middlesbrough.—Additions to Constantine technical college, for the E.C.

Newcastle-on-Tyne.—Houses (24), Felixstowe Drive, &c.; Marshall, Tweedy & Bourn, architects, 129, Pilgrim Street, Newcastle-on-Tyne. Flats, Chillingham Road; F. Davies, architect, 560, Durham Road, Gateshead-on-Tyne.

Newton-in-Makerfield.—Houses (180), Crow Hall, Newton-le-Willows; Pierpoint & Worthington, architects, 31, King Street, Wigan.

Oldbury.—Houses, Holt Farm (£10,670), and Bleakhouse estate (£12,757); J. Harper & Sons, Ltd. Factory and offices, Wolverhampton Road; Titford Property Co.

Ossett.—Estate development, Eden Avenue; Hepworth & Moorhouse.

Peterborough.—Houses (44), Park Lane estate; A. J. Reeves, town clerk, town hall.

Pontefract.—Houses (62), Churchbalk Lane; borough engineer.

Portsmouth.—Printing works for Timothy Whites & Taylors, Ltd., Chandor Street. Signal school, Stamshaw (£350,000), for Admiralty.

Rainford.—Cinema, Church Road, for I. Vose, Dentons Green Lane, St. Helens.

Richmond (Surrey).—Additions and alterations to County School for Girls (£15,028); H. L. Lacey, contractor, Leatherhead.

Rotherham.—Drill hall, Fitzwilliam Street; West Riding Territorial Army Association. Works for the English Steels, Ltd., High Street, Sheffield; Fenton & Robinson, architects, 10, Paradise Square, Sheffield. Schools, Clough Bank and Coleridge Road, for E.C.; education architect. Extensions to works, Grange Hill Lane; British Acheson Electrodes, Ltd.

Sheffield.—Houses (28) and garages, &c., between Brooklands Avenue and Whiteley Lane; T. W. Knowles, Ltd., builders, Turners Lane. Houses (32), Grimesthorpe Road, and street, for J. Samuel. Aerodrome, Todwick; city engineer. Cinema, Herries Road; M. J. Gleeson, Ltd., builders, 822, Chesterfield Road. Hospital, Glossop Road; Hospitals Council.

Skegness.—Buildings (£20,000), for the Board of Management of the Skegness and District Hospital; W. F. Wills, architect, Darley Seacroft, Skegness.

Smethwick.—Extensions to works, for C. Carr & Co., Ltd., Grove Lane.

Southall.—Houses (151), Towers estate; R. Fielding & Sons. Factory, Havelock Road; Economic Oils & Fuels, Ltd.

Southport.—Flats (26), Birch Street; borough engineer. Extensions to technical college (£4,550); J. Partington, Ltd.

Sowerby Bridge.—Extensions to Mearclough works, for Siddall & Hilton, Ltd.

Stoke-on-Trent.—Schools, Chell (£35,980) and Blurton (£2,595); city architect.

Stretford.—Extensions to works, Ayres Road; Switchgear & Cowans, Ltd.

Swindon.—Houses (42), Headlands Grove; A. J. Colborne. Sports stadium, Edinburgh Street; G. E. Marshall & Partners.

Torquay.—R.C. school, Quinta Lane; Father MacSweeney.

Wallsend-on-Tyne.—Houses (32) in flats on the East Farm estate; J. H. James, builder, Westfield estate.

Walsall.—Houses (24), Goscote estate (£7,222); Dickinson & Holford, Ltd.

Watchet (SOMERSET).—Cinema, Esplanade, for T. Barton-Peel; H. Pollard & Sons, contractors, Monmouth Road, Bridgwater.

West Bromwich.—Technical college; T. Spencer Wood, architect.

Wolverhampton.—Factory, Park Road, Low Hill; A. & J. Ammies & Son, builders, Melbourne Street, Wolverhampton.

Wood Green.—School, White Hart Lane (£43,021); T. Bates & Son, Ltd., contractors, River Road, Barking, Essex.

Worcestershire.—School, Stourbridge (£37,400), for County E.C.

Worthing.—Houses (16), Ardingley Drive; Chatsmere Estates, Ltd. Houses (24), Clarendon Road; Somnting Manor Estates, Ltd. Houses (14), Field Place estate; Yates, Cook & Darbyshire. Houses (16), Mulberry Lane; H. Nichol & Co.